Lenovo

BladeCenter Interoperability Guide

Quick reference for BladeCenter interoperability

Includes internal components and external connectivity

Covers software compatibility

Discusses storage interoperability

Ilya Krutov

David Watts

Note: Before using this information and the product it supports, read the information in “Notices” on page iii.

Last update on 24 February 2015

This edition applies to:
BladeCenter E
BladeCenter H
BladeCenter HT
BladeCenter S
BladeCenter HS12 type 8028
BladeCenter HS22
BladeCenter HS22V
BladeCenter HS23 (E5-2600)
BladeCenter HS23 (E5-2600 v2)
BladeCenter HS23E
BladeCenter HX5
BladeCenter PS700/701/702
BladeCenter PS703/704

Contents

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consulty our local Lenovo representative for information on the products and services currently available in yourarea. 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.
1009 Think Place - Building One
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.

Trademarks

Lenovo, the Lenovo logo, and For Those Who Do are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. These and other Lenovo trademarked terms are marked on their first occurrence in this information with the appropriate symbol (® or ™), indicating US registered or common law trademarks owned by Lenovo at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of Lenovo trademarks is available on the Web at http://www.lenovo.com/legal/copytrade.html.

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

BladeCenter®
BladeCenter Open Fabric™
Flex System™
Lenovo®
MAX5™
RackSwitch™
Lenovo(logo)®
ServeRAID™
ServerProven®
System x®

The following terms are trademarks of other companies:

Intel, Intel Xeon, Intel logo, Intel Inside logo, and Intel Centrino logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, and the Windows logo 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.

Preface

BladeCenter® integrates server, storage, and networking functionality with technology exchange and heterogeneous management. BladeCenter offers the ease, density, availability, affordability, and scalability that are central to the blade technology promise.

Blade servers captured industry focus because of their modular design. This design can reduce costs with a more efficient usage of valuable floor space, and their simplified management, which can speed up such tasks as deploying, reprovisioning, updating, and troubleshooting hundreds of blade servers. In addition, blade servers provide improved performance by doubling current rack density. By integrating resources and sharing key components, costs are reduced and availability is increased.

This Lenovo® Press publication is a reference to compatibility and interoperability of components inside and connected to BladeCenter solutions. It provides guidance on supported configurations for blades, switches, and other options for all BladeCenter platforms. This paper is intended for IT professionals looking for compatibility and interoperability information of BladeCenter solution components.

The latest version of this document can be downloaded from:

http://lenovopress.com/bcig

Authors

This document is produced by the following subject matter experts working in the Lenovo offices in Morrisville, NC, USA.

Ilya Krutov is a Project Leader at Lenovo Press. He manages and produces pre-sale and post-sale technical publications on various IT topics, including x86 rack and blade servers, server operating systems, virtualization and cloud, networking, storage, and systems management. Ilya has more than 15 years of experience in the IT industry, backed by professional certifications from Cisco Systems, IBM, and Microsoft. During his career, Ilya has held a variety of technical and leadership positions in education, consulting, services, technical sales, marketing, channel business, and programming. He has written more than 200 books, papers, and other technical documents. Ilya has a Specialist's degree with honors in Computer Engineering from the Moscow State Engineering and Physics Institute (Technical University).

David Watts is a Senior IT Consultant and the program lead for Lenovo Press. He manages residencies and produces pre-sale and post-sale technical publications for hardware and software topics that are related to System x, ThinkServer, Flex System, and BladeCenter servers. He has authored over 300 books and papers. David has worked in the IT industry, both in the U.S. and Australia, since 1989, and is currently based in Morrisville, North Carolina. David holds a Bachelor of Engineering degree from the University of Queensland (Australia).

Special thanks to the previous authors of this document:

- Suzanne Michelich
- Ashish Jain
- Jeneea Jervay
- Karin Beaty

Comments welcome

Your comments are important to us!

We want our documents to be as helpful as possible. Send us your comments about this paper in one of the following ways:

- Use the online feedback form found at the web page for this document:

  `http://lenovopress.com/bcig`

- Send your comments in an email to:

  `comments@lenovopress.com`

Do you have the latest version?

We update our books and papers from time to time, so check whether you have the latest version of this document by clicking the **Check for Updates** button on the front page of the PDF. Pressing this button will take you to a web page that will tell you if you are reading the latest version of the document and give you a link to the latest if needed. While you're there, you can also sign up to get notified via email whenever we make an update.

1

Chassis interoperability

There are five chassis in the BladeCenter family:

- *BladeCenter E* provides the greatest density and common fabric support. This chassis is the lowest entry cost option.
- *BladeCenter H* delivers high performance, extreme reliability, and ultimate flexibility for the most demanding IT environments.
- *BladeCenter HT* is designed for high-performance flexible telecommunications environments by supporting high-speed internet working technologies, such as 10G Ethernet. This chassis provides a robust platform for next-generation networks (NGNs).
- *BladeCenter S* combines the power of blade servers with integrated storage, all in an easy-to-use package that is designed specifically for the office and distributed enterprise environment.
- *BladeCenter T* was originally designed specifically for telecommunications network infrastructures and other rugged environments. It is no longer available for ordering.

The following sections are covered in this chapter:

1.1 Server to chassis compatibility

Table 1-1 lists blade servers that are supported in each BladeCenter chassis.

Table 1-1 The blade servers supported in each BladeCenter chassis

Blade[a]	Machine type	Blade width	BC S 8886 (6 bays)	BC E 8677 (14 bays)	BC T DC 8720 AC 8730 (8 bays)	BC H 8852 (14 bays)	BC HT DC 8740 AC 8750 (12 bays)
HS12	8028	Single	Yes	Yes	Yes	Yes	Yes
HS22	7870	Single	Yes[b]	Yes[b]	No	Yes[b]	Yes[b]
HS22V	7871	Single	Yes[c]	Yes[c]	No	Yes[c]	Yes[c]
HS23	7875 (E5-2600)	Single	Yes	Yes[d]	No	Yes[d]	Yes[d]
HS23	7875 (E5-2600 v2)	Single	Yes	Yes[e]	No	Yes[e]	Yes[e]
HS23E	8038	Single	Yes	Yes[f]	No	Yes	Yes
HX5	7872	Single[g]	Yes[h]	No	No	Yes[h]	Yes[h]
HX5	7873	Single[g]	Yes[h]	No	No	Yes[h]	Yes[h]
PS700	8406	Single	Yes	Yes[i]	No	Yes	Yes
PS701	8406	Single	Yes	No	No	Yes	Yes
PS702	8406	Double	Yes	No	No	Yes	Yes
PS703	7891	Single	Yes	No	No	Yes	Yes
PS704	7891	Double	Yes	No	No	Yes	Yes

a. All blades that are listed are supported only with the Advanced Management Module.
b. Certain rules apply to the installation of the HS22 blade server in the chassis. See 1.1.1, “HS22 chassis support” on page 3 for more information.
c. Certain rules apply to the installation of the HS22V blade server in the chassis. See 1.1.2, “HS22V chassis support” on page 4 for more information.
d. Certain rules apply to the installation of the HS23 (E5-2600) blade server in the chassis. See 1.1.3, “HS23 (E5-2600) chassis support” on page 5 for more information.
e. Certain rules apply to the installation of the HS23 (E5-2600 v2) blade server in the chassis. See 1.1.4, “HS23 (E5-2600 v2) chassis support” on page 6 for more information.
f. Certain rules apply to the installation of the HS23E blade server in the chassis. See 1.1.5, “HS23E chassis support” on page 7 for more information.
g. Two single-wide HX5 blades can be combined into a single 4-socket double-wide blade. HX5 blade with the MAX5™ memory expansion unit is a double-wide blade.
h. Certain rules apply to the installation of the HX5 blade server in the chassis. See 1.1.6, “HX5 chassis support” on page 8 for more information.
i. Only specific models of the BladeCenter E support the PS700. See 1.1.7, “PS700 chassis support” on page 9.

Consideration: It is highly recommended to verify chassis support for the configuration being proposed, using the Power Configurator tool:

http://www.ibm.com/systems/bladecenter/resources/powerconfig.html

Chassis support table conventions:

- A green cell means that the chassis can be filled with blade servers up to the maximum number of blade bays in the chassis.
- A yellow cell means that the maximum number of blades that the chassis can hold is fewer than the total available blade bays. The maximum number of blades supported is shown as *M*+*N*, where *M* and *N* are the numbers of blades in the power domains A and B, respectively. Other bays in the chassis must remain empty.
- A white cell with *None* means that there is no chassis support for the selected CPU thermal design power (TDP).

1.1.1 HS22 chassis support

The HS22 type 7870 chassis support depends on the type and models of the chassis and the power supplies and cooling modules (blowers) in the chassis, as shown in Table 1-2 (check "Chassis support table conventions:").

BladeCenter E considerations:

- The HS22 is not supported in BladeCenter E chassis with power supplies that have a capacity less than 2000 W.
- The HS22 requires an advanced management module to be installed in the BladeCenter E.

Table 1-2 HS22 chassis compatibility

CPU TDP	Maximum number of HS22 supported in each chassis								
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (14 bays)				BC-HT DC (8740) (12 bays)[a]	BC-HT AC (8750) (12 bays)[a]
				2900 W power supplies		2980 W power supplies[b]			
	2000 W power supplies	2320 W power supplies		Std. blower	Enh. blower[c]	Std. blower	Enh. blower[c]		
Intel Xeon processors									
130 W	None	None	5	None	14	None	14	4+4	5+5
95 W	5+6	14	6	6+6	14	14	14	12	12
80 W	5+7	14	6	14	14	14	14	12	12
60 W	6+7	14	6	14	14	14	14	12	12
40 W	14	14	6	14	14	14	14	12	12

a. For non-NEBS (Enterprise) environments, HS22 models with up to 130 W CPUs are supported. For NEBS environments, HS22 models with up to 80 W CPUs are supported (only specific CPUs are supported, see Table 5-1 on page 68).
b. BladeCenter H 2980 W AC Power Modules, 68Y6601 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).
c. BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).

1.1.2 HS22V chassis support

The HS22V type 7871 chassis support depends on the type and models of the chassis and the power supplies and cooling modules (blowers) in the chassis, as shown in Table 1-3 (check “Chassis support table conventions:” on page 3).

BladeCenter E considerations:

- The HS22V is not supported in BladeCenter E chassis with power supplies that have a capacity less than 2000 W.
- The HS22V requires an advanced management module to be installed in the BladeCenter E.

Table 1-3 HS22 chassis compatibility

CPU TDP	Maximum number of HS22V supported in each chassis								
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (14 bays)				BC-HT DC (8740) (12 bays)[a]	BC-HT AC (8750) (12 bays)[a]
	2000 W power supplies	2320 W power supplies		2900 W power supplies		2980 W power supplies[b]			
				Std. blower	Enh. blower[c]	Std. blower	Enh. blower[c]		
Intel Xeon processors									
130 W	None	None	5	None	14	None	14	4+4	5+5
95 W	5+6	14	6	6+6	14	14	14	12	12
80 W	5+7	14	6	14	14	14	14	12	12
60 W	6+7	14	6	14	14	14	14	12	12
40 W	14	14	6	14	14	14	14	12	12

a. For non-NEBS (Enterprise) environments, HS22V models with up to 130 W CPUs are supported. For NEBS environments, HS22V models with up to 80 W CPUs are supported (only specific CPUs are supported, see Table 5-1 on page 68).

b. BladeCenter H 2980 W AC Power Modules, 68Y6601 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).

c. BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).

1.1.3 HS23 (E5-2600) chassis support

The HS23 (7875, E5-2600) chassis support depends on the type and models of the chassis and the power supplies and cooling modules (blowers) in the chassis, as shown in Table 1-4 (check “Chassis support table conventions:” on page 3).

BladeCenter E considerations:

- The HS23 is not supported in BladeCenter E chassis with power supplies that have a capacity less than 2000 W.
- The HS23 requires an advanced management module to be installed in the BladeCenter E.
- Chassis USB and AMM remote USB functions are not supported in BladeCenter E 8677-1xx, 2xx, 3xx, and Exx models.

Table 1-4 HS23 (E5-2600) chassis compatibility

CPU TDP	Maximum number of HS23 supported in each chassis								
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (14 bays)				BC-HT DC (8740) (12 bays)[a]	BC-HT AC (8750) (12 bays)[a]
	2000 W power supplies	2320 W power supplies		2900 W power supplies		2980 W power supplies[b]			
				Std. blower	Enh. blower[c]	Std. blower	Enh. blower[c]		
Intel Xeon processors									
130 W	None	None	6	None	14	None	14	5+5	5+5
115 W	None	None	6	None	14	None	14	5+5	5+5
95 W	None	None	6	None	14	None	14	12	12
80 W	6+7	14	6	14	14	14	14	12	12
70 W	None	None	6	None	14	None	14	12	12
60 W	None	None	6	None	14	None	14	12	12
Intel Xeon robust thermal profile processors[d]									
95 W	5+7	14	6	14	14	14	14	12	12
70 W	14	14	6	14	14	14	14	12	12

a. Support shown is for non-NEBS (Enterprise) environments. For NEBS support, refer to 5.1, “Telco blades to telco chassis interoperability” on page 68. Only certain HS23 (7875, E5-2600) options were tested for NEBS compliance (See Table 5-4 on page 70).

b. BladeCenter H 2980 W AC Power Modules, 68Y6601 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).

c. BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).

d. Intel Xeon E5-2648L (70 W) and E5-2658 (95 W) are robust thermal profile processors that are used in HS23 (7875, E5-2600).

1.1.4 HS23 (E5-2600 v2) chassis support

The HS23 (7875, E5-2600 v2) chassis support depends on the type and models of the chassis and the power supplies and blowers in the chassis, as shown in Table 1-5 (check “Chassis support table conventions:” on page 3).

BladeCenter E considerations:

- The HS23 is not supported in BladeCenter E chassis with power supplies that have a capacity less than 2000 W.
- The HS23 requires an advanced management module to be installed in BladeCenter E.
- Chassis USB and AMM remote USB functions are not supported in BladeCenter E 8677-1xx, 2xx, 3xx, and Exx models.

Table 1-5 HS23 (E5-2600 v2) chassis compatibility

CPU TDP	Maximum number of HS23 supported in each chassis								
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (14 bays)				BC-HT DC (8740) (12 bays)[a]	BC-HT AC (8750) (12 bays)[a]
	2000 W power supplies	2320 W power supplies		2900 W power supplies		2980 W power supplies[b]			
				Std. blower	Enh. blower[c]	Std. blower	Enh. blower[c]		
Intel Xeon processors									
130 W	None	None	6	None	14[d]	None	14[d]	5+5	5+5
115 W	None	None	6	None	14	None	14	5+5	5+5
95 W	None	None	6	None	14	None	14	12	12
80 W	6+7[e]	14[e]	6	14[e]	14	14[e]	14	12	12
70 W	None	None	6	None	14	None	14	12	12
60 W	None	None	6	None	14	None	14	12	12
Intel Xeon robust thermal profile processors[f]									
95 W	5+7[e,g]	14[e,g]	6	14[e,g]	14	14[e,g]	14	12	12
70 W	14[e]	14[e]	6	14[e]	14	14[e]	14	12	12
50 W	14	14	6	14	14	14	14	12	12

a. Support shown is for non-NEBS (Enterprise) environments.
b. BladeCenter H 2980 W AC Power Modules, 68Y6601 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).
c. BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).
d. E5-2697 v2 and E5-2690 v2 processors throttle at Steady State at ambient temperature of 31 °C in BladeCenter H.
e. When one blower fails, the HS23 (7875, E5-2600 v2) with specified processor TDP only supports ambient temperature of up to 28 °C when installed in BladeCenter H with the standard blowers or BladeCenter E.
f. Intel Xeon E5-2618L v2 (50 W), E5-2628L v2 (70 W), E5-2648L v2 (70 W), and E5-2658 v2 (95 W) are robust thermal profile processors used in HS23 (7875, E5-2600 v2).
g. The HS23 (7875, E5-2600 v2) with the Intel Xeon processor E5-2658 v2 (95 W) only supports one DIMM per channel when installed in the BladeCenter H with the standard blowers or BladeCenter E.

1.1.5 HS23E chassis support

The HS23E type 8038 chassis support depends on the type and models of the chassis and the power supplies and cooling modules (blowers) in the chassis, as shown in Table 1-6 (check “Chassis support table conventions:” on page 3).

BladeCenter E considerations:

- The HS23E is not supported in BladeCenter E chassis with power supplies that have a capacity less than 2000 W.
- The HS23E requires an advanced management module to be installed in the BladeCenter E.
- When specified memory modules (part numbers 46C0568 or 90Y3221) are installed in HS23E models that have 95 W processors, only the following configurations are supported:
  - One 95 W processor and up to two DIMMs per channel (six DIMMs total)
  - Two 95 W processors and one DIMM per channel (six DIMMs total)

Table 1-6 HS23E chassis compatibility

CPU TDP	Maximum number of HS23E supported in each chassis								
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (14 bays)				BC-HT DC (8740) (12 bays)[a]	BC-HT AC (8750) (12 bays)[a]
	2000 W power supplies	2320 W power supplies		2900 W power supplies		2980 W power supplies[b]			
				Std. blower	Enh. blower[c]	Std. blower	Enh. blower[c]		
Intel Xeon processors									
95 W	5+6	14	6	14	14	14	14	12	12
80 W	5+7	14	6	14	14	14	14	12	12
70 W	14	14	6	14	14	14	14	12	12
60 W	14	14	6	14	14	14	14	12	12
Intel Xeon robust thermal profile processors[d]									
70 W	14	14	6	14	14	14	14	12	12
60 W	14	14	6	14	14	14	14	12	12
50 W	14	14	6	14	14	14	14	12	12

a. Support shown is for non-NEBS (Enterprise) environments. For NEBS support, refer to 5.1, “Telco blades to telco chassis interoperability” on page 68. Only certain HS23E options were tested for NEBS compliance (See Table 5-5 on page 71).

b. BladeCenter H 2980 W AC Power Modules, 68Y6601 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).

c. BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).

d. Intel Xeon E5-2418L (50 W), E5-2428L (60 W), and E5-2448L (70 W) are robust thermal profile processors used in HS23E.

1.1.6 HX5 chassis support

The HX5 types 7872 and 7873 chassis support depends on the type and models of the chassis and the power supplies and cooling modules (blowers) in the chassis, as shown in Table 1-7 (check “Chassis support table conventions:” on page 3).

Table 1-7 HX5 chassis compatibility

Server	CPU TDP	Maximum number of HX5 supported in each chassis						
		BC-S (8886) (6 bays)	BC-H (14 bays)				BC-HT DC (8740) (12 bays)[a]	BC-HT AC (8750) (12 bays)[a]
			2900 W power supplies		2980 W power supplies[b]			
			Std. blower	Enh. blower[c]	Std. blower	Enh. blower[c]		
HX5 single-wide	130 W	4	None	10	None	12	6	8
	105 W	5	14	14	14	14	10	10
	95 W	5	14	14	14	14	10	10
HX5 + MAX5 double-wide	130 W	2	6	6	7	7	4	5
	105 W	2	7	7	7	7	5	5
	95 W	2	7	7	7	7	5	5

a. Support shown is for non-NEBS (Enterprise) environments.
b. BladeCenter H 2980W AC Power Modules, 68Y6601 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models)
c. BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models)

Consideration: Blades other than 130 W HX5 can be installed in a power domain if fewer than the maximum number of HX5 blades is deployed. The exact quantity that is supported can be determined with the Power Configurator tool.

1.1.7 PS700 chassis support

Only specific models of the BladeCenter E models are supported with the PS700. The following models are supported with the PS700:

- 8677-3Sx
- 8677-4Sx
- 8677-3Tx
- 8677-4Tx

Considerations:

- *x* in the model number represents a country-specific letter (for example, EMEA MTM is 8677-4SG, and the US MTM is 8677-4SU).
- The 3Sx and 3Tx models are supported but only with upgraded (2320W) power supplies.

1.2 I/O module to chassis interoperability

This section describes I/O module to chassis interoperability. The following topics are covered:

1.2.1 SAS, InfiniBand, Pass-thru, and interconnect modules interoperability

Table 1-8 lists the I/O modules that are supported in each BladeCenter chassis.

Considerations:

- SAS I/O modules can be installed in chassis I/O bays 3 and 4.
- High-speed InfiniBand I/O modules can be installed in chassis I/O bays 7, 8, 9, and 10.
- Intelligent Copper Pass-thru Module can be installed in chassis I/O bays 1, 2, 3, and 4. This module can also be installed in left and right I/O bays of the MSIM.
- 10Gb Ethernet Pass-thru Module can be installed in chassis I/O bays 7, 8, 9, and 10.
- MSIM or MSIM-HT can be installed in the adjacent high-speed I/O bays 7 and 8 or 9 and 10.

Table 1-8 The I/O modules that are supported in each BladeCenter chassis

I/O module[a]	Part number	Feature code (x-config/ e-config)	BC S	BC E	BC T	BC H	BC HT	MSIM	MSIM-HT
SAS modules									
SAS Connectivity Module	39Y9195	2980/3267	Y	Y	Y	Y	Y	N	N
SAS RAID Controller Module	43W3584	3734/none	Y	N	N	N	N	N	N
InfiniBand Modules									
Voltaire 40Gb InfiniBand Switch Module[b]	46M6005	0057/3204	N	N	N	Y	N	N	N
Pass-through and interconnect modules									
Intelligent Copper Pass-thru Module	44W4483	5452/5452	Y	Y	Y	Y	Y	Y	N
10Gb Ethernet Pass-thru Module	46M6181	1641/5412	N	N	N	Y	Y	N	N
Multi-Switch Interconnect Module	39Y9314	1465/3239	N	N	N	Y	N	N	N
Multi-Switch Interconnect Module for BC HT	44R5913	5491/none	N	N	N	N	Y	N	N

a. All I/O modules that are listed are supported only with the advanced management module.
b. Double-height high-speed switch module; occupies two adjacent high-speed bays.

1.2.2 Ethernet I/O module interoperability

Table 1-9 lists the Ethernet I/O modules that are supported in each BladeCenter chassis.

Considerations:

- Standard Ethernet I/O modules can be installed in chassis I/O bays 1, 2, 3, and 4.
- Standard Ethernet I/O modules can be installed in left and right I/O bays of the MSIM or MSIM-HT.
- High-speed Ethernet I/O modules can be installed in chassis I/O bays 7, 8, 9, and 10.

Table 1-9 The I/O modules that are supported in each BladeCenter chassis

I/O module[a]	Part number	Feature code (x-config/ e-config)	BC S	BC E	BC T	BC H	BC HT	MSIM	MSIM-HT
Standard Ethernet switch modules									
Cisco Catalyst Switch Module 3110G[b]	41Y8523	2989/3173	N	Y	Y	Y	Y	Y	Y
Cisco Catalyst Switch Module 3110G	00Y3254	A3FD/3173	N	Y	Y	Y	Y	Y	Y
Cisco Catalyst Switch Module 3110X[b]	41Y8522	2988/3171	N	Y	Y	Y	Y	Y	Y
Cisco Catalyst Switch Module 3110X	00Y3250	A3FC/3171	N	Y	Y	Y	Y	Y	Y
Cisco Catalyst Switch Module 3012[b]	43W4395	5450/3174	Y	Y	Y	Y	Y	Y	Y
Cisco Catalyst Switch Module 3012	46C9272	A3FE/3174	Y	Y	Y	Y	Y	Y	Y
Server Connectivity Module[c]	39Y9324	1484/3220	Y	Y	Y	Y	Y	Y	N
L2/3 Copper GbE Switch Module[c]	32R1860	1495/3212	Y	Y	Y	Y	Y	Y	Y
L2/3 Fiber GbE Switch Module[c]	32R1861	1496/3213	Y	Y	Y	Y	Y	Y	Y
L2-7 Gb Ethernet Switch Module[c]	32R1859	1494/3211	Y	Y	Y	Y	Y	N	N
1/10Gb Uplink ESM	44W4404	1590/1590	Y	Y	Y	Y	Y	Y	Y
High-speed Ethernet switch modules									
Virtual Fabric 10Gb Switch Module	46C7191	1639/3248	N	N	N	Y	Y	N	N
Brocade Converged 10GbE Switch Module[d]	69Y1909	7656/none	N	N	N	Y	Y	N	N
Cisco Nexus 4001I Switch Module[b]	46M6071	0072/2241	N	N	N	Y	Y	N	N
Cisco Nexus 4001I Switch Module	46C9270	A3FF/2241	N	N	N	Y	Y	N	N

a. With few exceptions explicitly specified in the respective footnote, all I/O modules that are listed are supported only with the advanced management module.
b. This I/O module is withdrawn. It is not available for ordering.
c. This I/O module is supported with the advanced management module and with the management module.
d. Double-height high-speed switch module; occupies two adjacent high-speed bays.

1.2.3 Fibre Channel I/O module interoperability

Table 1-10 lists the Fibre Channel I/O modules that are supported in each BladeCenter chassis.

Considerations:

- FC I/O modules can be installed in chassis I/O bays 3 and 4.
- FC I/O modules can be installed in MSIM or MSIM-HT right I/O bays.

Table 1-10 The Fibre Channel I/O modules that are supported in each BladeCenter chassis

I/O module[a]	Part number	Feature code (x-config/ e-config)	BC S	BC E	BC T	BC H	BC HT	MSIM	MSIM-HT
Fibre Channel I/O modules									
Brocade Enterprise 20-port 8Gb SAN SM	42C1828	5764/none	N	Y	N	Y	Y[b]	Y	N
Brocade 20-port 8Gb SAN Switch Module	44X1920	5481/5869	N	Y	N	Y	Y[b]	Y	Y
Brocade 10-port 8Gb SAN Switch Module	44X1921	5483/5045	N	Y	N	Y	Y[b]	Y	Y
Cisco 4Gb 20 port FC Switch Module	39Y9280	2983/3242	N	Y	Y[c]	Y	Y[c]	Y	N
Cisco 4Gb 20 port FC Switch Module[d]	44E5696	A3FH/3242	N	Y	Y[c]	Y	Y[c]	Y	N
Cisco 4Gb 10 port FC Switch Module	39Y9284	2984/3241	Y	Y	Y[c]	Y	Y[c]	Y	N
Cisco 4Gb 10 port FC Switch Module[d]	44E5692	A3FG/3241	Y	Y	Y[c]	Y	Y[c]	Y	N
QLogic 20-Port 8Gb SAN Switch Module	44X1905	5478/3284	Y	Y	Y[e]	Y	Y[b]	Y	Y
QLogic 20-Port 4/8Gb SAN Switch Module[f]	88Y6406	A24C/none	Y	Y	Y[e]	Y	Y[b]	Y	Y
QLogic 8Gb Intelligent Pass-thru Module	44X1907	5482/5449	Y	Y	Y[e]	Y	Y[b]	Y	N
QLogic 4/8Gb Intelligent Pass-thru Module[f]	88Y6410	A24D/none	Y	Y	Y[e]	Y	Y[b]	Y	N
QLogic Virtual Fabric Extension Module[g]	46M6172	4799/none	N	N	N	Y	N	N	N

a. All I/O modules that are listed in Table 1-10 are supported only with the advanced management module.
b. When 8 Gb FC switch modules are installed in I/O bays 3 and 4 of the BladeCenter HT chassis, then internal connections between blades and these switch modules support speeds up to 4 Gbps. External connections between these switch modules and external FC switches or storage devices support speeds up to 8 Gbps, depending on the capabilities of the external FC devices connected.
c. When 4 Gb FC switch modules are installed in I/O bays 3 and 4 of the BladeCenter T or HT chassis, then internal connections between blades and these switch modules support speeds up to 2 Gbps. External connections between these switch modules and external FC switches or storage devices support speeds up to 4 Gbps, depending on the capabilities of the external FC devices connected.
d. This I/O module is withdrawn. It is not available for ordering.
e. When 8 Gb FC switch modules are installed in I/O bays 3 and 4 of the BladeCenter T chassis, then internal connections between blades and these switch modules support speeds up to 2 Gbps. External connections between these switch modules and external FC switches or storage devices support speeds up to 8 Gbps, depending on the capabilities of the external FC devices connected.
f. Internal ports on QLogic 4/8 Gb SAN Switch and Pass-thru modules support up to 4 Gb speeds when these I/O modules installed in I/O bays 3 and 4.
g. QLogic Virtual Fabric Extension Module is supported in chassis I/O bays 3 and 5 of the BladeCenter H chassis. It requires the Virtual Fabric 10Gb Switch Module.

1.3 I/O module to adapter interoperability

This section describes I/O module to adapter interoperability.

1.3.1 I/O module bay to adapter mappings

The different BladeCenter chassis have different numbers and types of I/O bays. The chassis support the following I/O bays.

- BladeCenter S, E, and T have four standard I/O bays (1, 2, 3, and 4).
- BladeCenter H has four standard I/O bays (1, 2, 3, and 4), two bridge bays (5 and 6), and four high-speed bays (7, 8, 9, and 10).
- BladeCenter HT has four standard I/O bays (1, 2, 3, and 4) and four high-speed bays (7, 8, 9, and 10).

Table 1-11 shows chassis I/O module bay to adapter mappings by expansion card type.

Table 1-11 Matching I/O bay numbers with I/O expansion card ports

Expansion card type	Chassis I/O bay number									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ethernet										
Integrated 2-port Gigabit Ethernet[a]	Y	Y	N	N	N	N	N	N	N	N
Integrated 2-port 10Gb Ethernet (LOM)	N	Y[b]	N	N	N	N	Y	N	Y	N
2-port Gigabit Ethernet (CFFv)	N	N	Y	Y	N	N	N	N	N	N
2-port Gigabit Ethernet (CIOv)	N	N	Y	Y	N	N	N	N	N	N
2/4-port Gigabit Ethernet (CFFh)[c]	N	Y	N	N	N	N	Y	Y	Y	Y
2-port 10Gb Ethernet (CFFh)	N	N	N	N	N	N	Y	N	Y	N
4-port 10Gb Ethernet (CFFh)	N	N	N	N	N	N	Y	Y	Y	Y
Emulex 10GbE VFA II (CFFh) for HS23	N	N	N	N	N	N	N	Y	N	Y
Fibre Channel										
2-port Fibre Channel (CFFv)	N	N	Y	Y	N	N	N	N	N	N
2-port Fibre Channel (CIOv)	N	N	Y	Y	N	N	N	N	N	N
Combo 2-port Gigabit Ethernet and 2-port FC (CFFh)[d]	N	N	N	N	N	N	Y	Y	Y	Y
SAS										
2-port SAS (CFFv)	N	N	Y	Y	N	N	N	N	N	N
2-port SAS (CIOv)	N	N	Y	Y	N	N	N	N	N	N
InfiniBand										
2-port InfiniBand (CFFh)	N	N	N	N	N	N	Y	N	Y	N

a. In a BladeCenter S chassis, both ports on this expansion card are routed to I/O bay 1.
b. Supported only in the BladeCenter chassis. Both 10 GbE ports are routed to the I/O bay 2 of the BladeCenter S chassis and operate at 1 Gbps speed.
c. I/O bay 2 is supported only when this card is installed in a blade server that is installed in the BladeCenter S chassis.
d. Requires MSIM or MSIM-HT. Ethernet ports are routed to I/O bays 7 and 9; FC ports are routed to I/O bays 8 and 10.

1.3.2 Ethernet I/O modules and adapters

Table 1-12 lists Ethernet I/O module to card compatibility.

Table 1-12 1 Gb and 10 Gb Ethernet I/O module: Expansion card compatibility (Part 1)

	Ethernet Expansion Cards →	**1 Gb to the blade**					**10 Gb to the blade**				
Part number	**I/O module**	Integrated Gigabit Ethernet	**39Y9310** Ethernet Expansion Card (CFFv)	**44W4475** Ethernet Expansion Card (CIOv)	**44W4479** 2/4 Port Ethernet (CFFh)	**00Y3270** (replaces 44X1940) QLogic Eth. and 8GB FC (CFFh)	**46M6164** Broadcom 10Gb Gen 2 4-pt Eth. (CFFh)	**46M6168** Broadcom 10Gb Gen 2 2-pt Eth. (CFFh)	**81Y3133** Broadcom 2-port 10Gb VFA (CFFh)	**90Y3570** Mellanox 2-port 10Gb Eth. (CFFh)	**42C1810** Intel 10Gb 2-port Eth. (CFFh)
Gigabit Ethernet I/O modules (External ports operate at 1 Gbps)											
32R1859	Layer 2-7 Gb Ethernet Switch	Y	Y	Y	N	N	N	N	N	N	N
32R1860	Layer 2/3 Copper Gb Switch	Y	Y	Y	Y[a]	Y[a]	N	N	N	N	N
32R1861	Layer 2/3 Fiber Gb Switch	Y	Y	Y	Y[a]	Y[a]	N	N	N	N	N
39Y9324	Server Connectivity Module	Y	Y	Y	Y[b]	Y[b]	N	N	N	N	N
00Y3250[c]	Cisco Catalyst Switch 3110X	Y	Y	Y	Y[d]	Y[d]	N	N	N	N	N
00Y3254[e]	Cisco Catalyst Switch 3110G	Y	Y	Y	Y[d]	Y[d]	N	N	N	N	N
46C9272[f]	Cisco Catalyst Switch 3012	Y	Y	Y	Y[a]	Y[a]	N	N	N	N	N
44W4483	Intelligent Copper Pass-thru Module	Y	Y	Y	Y[b]	Y[b]	N	N	N	N	N
10 Gb Ethernet I/O modules (External ports operate at 10 Gbps)											
44W4404	1/10Gb Uplink Switch	Y	Y	Y	Y[a]	Y[a]	N	N	N	N	N
46C7191	Virtual Fabric 10Gb Switch	N	N	N	Y	N	Y	Y	Y	Y	N
69Y1909	Brocade Converged 10GbE Switch	N	N	N	N	N	N	N	N	N	N
46M6181	10Gb Ethernet Pass-thru Module	N	N	N	N	N	Y	Y	Y	N	N
46C9270[g]	Cisco Nexus 4001I Switch Module	N	N	N	Y	N	Y	Y	Y	Y	Y[h]

a. Supported in BladeCenter S in I/O bay 2 or in BladeCenter H and HT with the MSIM or MSIM-HT installed.
b. Supported in BladeCenter S in I/O bay 2 or in BladeCenter H with the MSIM installed.
c. Replaces 41Y8522.
d. Supported in BladeCenter H and HT with the MSIM or MSIM-HT installed.
e. Replaces 41Y8523.
f. Replaces 43W4395.
g. Replaces 46M6071.
h. Forces switch port to 10 Gb fixed; WoL not supported.

Table 1-13 lists Ethernet I/O module to card compatibility.

Table 1-13 1 Gb and 10 Gb Ethernet I/O module: Expansion card compatibility (Part 2)

	Ethernet Expansion Cards →	**10 Gb to the blade**										
Part number	**I/O module**	**49Y4235** Emulex VFA (CFFh)	**49Y4275** Emulex VFA Advanced (CFFh)	**90Y3550** Emulex VFA II (CFFh)	**90Y3566** Emulex VFA Advanced II (CFFh)	**81Y3120** Emulex VFA II (CFFh) for HS23	**90Y9332** Emulex VFA Adv. II (CFFh) for HS23	**94Y8550** 10Gb Interposer Card for HS23 (uses HS23 Integrated Virtual Fabric LOM)	**81Y1650** Brocade 2-port 10GbE CNA (CFFh)	**00Y3280** (replaces 42C1830) QLogic 2-port 10Gb CNA (CFFh)	**00Y3332** QLogic 10Gb Virtual Fabric Adapter	**00Y5618** QLogic 10Gb Virtual Fabric CNA
Gigabit Ethernet I/O modules (External ports operate at 1 Gbps)												
32R1859	Layer 2-7 Gb Ethernet Switch	N	N	N	N	N	N	N	N	N	N	N
32R1860	Layer 2/3 Copper Gb Switch	N	N	N	N	N	N	N	N	N	N	N
32R1861	Layer 2/3 Fiber Gb Switch	N	N	N	N	N	N	N	N	N	N	N
39Y9324	Server Connectivity Module	N	N	N	N	N	N	Y[a]	N	N	N	N
00Y3250[b]	Cisco Catalyst Switch 3110X	N	N	N	N	N	N	N	N	N	N	N
00Y3254[c]	Cisco Catalyst Switch 3110G	N	N	N	N	N	N	N	N	N	N	N
46C9272[d]	Cisco Catalyst Switch 3012	N	N	N	N	N	N	Y[a]	N	N	N	N
44W4483	Intelligent Copper Pass-thru Module	N	N	N	N	N	N	Y[a]	N	N	N	N
10 Gb Ethernet I/O modules (External ports operate at 10 Gbps)												
44W4404	1/10Gb Uplink Switch	N	N	N	N	N	N	Y[a]	N	N	N	N
46C7191	Virtual Fabric 10Gb Switch	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
69Y1909	Brocade Converged 10GbE Switch	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
46M6181	10Gb Ethernet Pass-thru Module	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
46C9270[e]	Cisco Nexus 4001I Switch Module	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N

a. Requires MSIM in BladeCenter H, MSIM-HT in BladeCenter HT, or BladeCenter S chassis.
b. Replaces 41Y8522.
c. Replaces 41Y8523.
d. Replaces 43W4395.
e. Replaces 46M6071.

1.3.3 Fibre Channel I/O modules and adapters

Table 1-14 lists Fibre Channel I/O module to card compatibility.

Limitation: Optical Pass-thru Module, part number 39Y9316, is not supported by any of the currently available Fibre Channel expansion cards.

Table 1-14 4 Gb and 8 Gb Fibre Channel I/O module: Expansion card compatibility

	Fibre Channel Expansion Cards →	**4 Gb Cards**		**8 Gb Cards**			
Part number	**I/O module**	**41Y8527** QLogic 4Gb FC (CFFv)	**46M6065** QLogic 4Gb FC (CIOv)	**44X1940** QLogic Eth. and 8Gb FC (CFFh)	**00Y3270** QLogic Eth. and 8Gb FC (CFFh)	**44X1945** QLogic 8Gb FC (CIOv)	**46M6140** Emulex 8Gb FC (CIOv)
8 Gb Fibre Channel I/O modules							
44X1905	QLogic 20-port 8Gb SAN Switch Module	Y	Y	Y	Y	Y[a]	Y
44X1907	QLogic 8Gb Intelligent Pass-thru Module	Y	Y	Y	Y	Y[a]	Y
42C1828	Brocade Enterprise 20-port 8Gb SAN Switch	Y	Y	Y	Y	Y[a]	Y
44X1920	Brocade 20-port 8Gb SAN Switch Module	Y	Y	Y	Y	Y[a]	Y
44X1921	Brocade 10-port 8Gb SAN Switch Module	Y	Y	Y	Y	Y[a]	Y
88Y6406	QLogic 20-Port 4/8Gb SAN Switch Module	Y	Y	Y	Y	Y	Y
88Y6410	QLogic 4/8Gb Intelligent Pass-thru Module	Y	Y	Y	Y	Y	Y
4 Gb Fibre Channel I/O modules							
32R1812[a]	Brocade 20-port 4Gb SAN Switch Module	Y	Y	Y	Y	N	N
32R1813[a]	Brocade 10-port 4Gb SAN Switch Module	Y	Y	Y	Y	N	N
44E5696[b]	Cisco Systems 4Gb 20 port FC Switch Module	Y	Y	Y	Y	Y	Y
44E5692[c]	Cisco Systems 4Gb 10 port FC Switch Module	Y	Y	Y	Y	Y	Y
43W6723[d]	QLogic 4Gb Intelligent Pass-thru Module	Y	Y	Y	Y	Y	Y
43W6724[a]	QLogic 10-port 4Gb SAN Switch Module	Y	Y	Y	Y	Y	Y
43W6725[a]	QLogic 20-port 4Gb SAN Switch Module	Y	Y	Y	Y	Y	Y

a. The QLogic 8Gb FC (CIOv) card does not support mixed vendor I/O module connectivity in chassis I/O bays 3 and 4. The QLogic and Brocade 8Gb FC switch modules cannot be used in I/O bays 3 and 4 at the same time.
b. Replaces 39Y9280.
c. Replaces 39Y9284.
d. This I/O module is withdrawn. It is not available for ordering.

1.3.4 InfiniBand switches and adapters

Table 1-15 lists InfiniBand switch to card compatibility.

Table 1-15 InfiniBand Switch Module: Expansion card compatibility

	InfiniBand Expansion Cards →	**DDR**	**QDR**
Part number	**I/O Module**	**43W4423** 4x InfiniBand DDR (CFFh)	**46M6001** 2-pt 40Gb InfiniBand (CFFh)
46M6005	Voltaire 40Gb InfiniBand Switch Module	Y	Y

1.3.5 SAS I/O modules and adapters

Table 1-16 lists SAS I/O module to card compatibility.

Table 1-16 SAS I/O Module: Expansion card compatibility

	SAS Expansion Cards →	**CFFv**		**CIOv**		
Part number	**I/O Module**	**39Y9190** SAS Exp. Card (CFFv)	**44E5688** SAS Exp. Card (CFFv)	**43W4068** SAS Connectivity (CIOv)	**46C7167** ServeRAID™ MR10ie (CIOv)	**90Y4750** ServeRAID H1135 (CIOv)
39Y9195	BladeCenter SAS Connectivity Module	Y	Y	Y	Y	Y
43W3584	BladeCenter S SAS RAID Controller Module	Y	Y	Y	N	Y

1.4 I/O module to transceiver interoperability

Transceivers and direct-attach copper (DAC) cables are supported by various BladeCenter I/O modules.

1.4.1 Ethernet I/O modules

Support for transceivers and cables for Ethernet switch modules is shown in Table 1-17.

Table 1-17 Transceivers and cables that are supported in Ethernet I/O modules

Part number	Feature codes[a]	Description	Layer 2/3 Fiber, 32R1861	1/10Gb Uplink, 44W4404	Virtual Fabric 10Gb, 46C7191	10Gb Ethernet Pass-thru, 46M6181	Brocade Converged 10Gb, 69Y1909	Cisco 3110X, 00Y3250[b]	Cisco Nexus 4001I, 46C9270[c]
SFP transceivers - 1 Gbps									
81Y1618	3268 / EB29	SFP RJ45 Transceiver (1000Base-T)	N	N	Y	N	N	N	N
00AY240	A4M8	RJ45 1Gbps Transceiver	Y	N	N	N	N	N	N
81Y1622	3269 / EB2A	SFP SX Transceiver (1000Base-SX)	Y	N	Y	N	N	N	N
90Y9424	A1PN / ECB8	SFP LX Transceiver (1000Base-LX)	Y	N	Y	N	N	N	N
88Y6058	A1A7	Cisco 1000BASE-T SFP Transceiver	N	N	N	N	N	Y[d]	Y
88Y6062	A1A8	Cisco 1000BASE-SX SFP Transceiver	N	N	N	N	N	Y[d]	Y
GLC-LH-SM(=)[e]		Cisco GE SFP, LC connector LX/LH transceiver	N	N	N	N	N	N	Y
SFP+ transceivers - 10 Gbps									
44W4408	4942 / 3282	10GbE 850 nm Fiber SFP+ Transceiver (SR)	N	Y	Y	Y	N	N	N
46C3447	5053 / EB28	SFP+ SR Transceiver (10GBase-SR)	N	Y	Y	Y	N	N	N
90Y9412	A1PM / ECB9	SFP+ LR Transceiver (10GBase-LR)	N	Y	Y	N	N	N	N
90Y9415	A1PP	SFP+ ER Transceiver (10GBase-ER)	N	N	Y	N	N	N	N
49Y4216	0069	Brocade 10Gb SFP+ SR Optical Transceiver	N	N	N	N	Y	N	N
88Y6054	A1A6	Cisco 10GBASE-SR SFP+ Transceiver	N	N	N	N	N	Y[d]	Y
SFP-10G-LR(=)[e]		Cisco 10GBASE-LR SFP+ Transceiver	N	N	N	N	N	N	Y
X2 transceivers and converters									
88Y6066	A1A9	Cisco OneX Converter Module (supports 1x SFP or SFP+ module)	N	N	N	N	N	Y	N

Part number	Feature codes[a]	Description	Layer 2/3 Fiber, 32R1861	1/10Gb Uplink, 44W4404	Virtual Fabric 10Gb, 46C7191	10Gb Ethernet Pass-thru, 46M6181	Brocade Converged 10Gb, 69Y1909	Cisco 3110X, 00Y3250[b]	Cisco Nexus 4001I, 46C9270[c]
X2-10GB-CX4=[e]		10GBASE-CX4 X2 transceiver module for CX4 cable, copper, InfiniBand 4X connector	N	N	N	N	N	Y	N
X2-10GB-SR=[e]		10GBASE-SR X2 transceiver module for MMF, 850-nm wavelength, SC duplex connector	N	N	N	N	N	Y	N
X2-10GB-LRM=[e]		10GBASE-LRM X2 transceiver module for MMF, 1310-nm wavelength, SC duplex connector	N	N	N	N	N	Y	N
CVR-X2-SFP=[e]		Cisco TwinGig X2 Converter Module (supports 2x 1GbE SFP modules)	N	N	N	N	N	Y	N
8 Gb Fibre Channel SFP+ transceivers									
44X1962	5084	Brocade 8Gb SFP+ SW Optical Transceiver	N	N	N	N	Y	N	N
SFP+ direct-attach copper (DAC) cables									
00D6288	A3RG / ECBG	0.5m Passive DAC SFP+ Cable	N	N	Y	N	N	N	N
90Y9427	A1PH / ECB4	1m Passive DAC SFP+ Cable	N	Y	Y	N	N	N	N
90Y9430	A1PJ / ECB5	3m Passive DAC SFP+ Cable	N	Y	Y	N	N	N	N
90Y9433	A1PK / ECB6	5m Passive DAC SFP+ Cable	N	Y	Y	N	N	N	N
00D6151	A3RH / ECBH	7m Passive DAC SFP+ Cable	N	N	Y	N	N	N	N
SFP-H10GB-CU1M=[e]		Cisco 10GBASE-CU SFP+ Cable 1 Meter	N	N	N	Y	N	N	Y
SFP-H10GB-CU3M=[e]		Cisco 10GBASE-CU SFP+ Cable 3 Meter	N	N	N	Y	N	N	Y
SFP-H10GB-CU5M=[e]		Cisco 10GBASE-CU SFP+ Cable 5 Meter	N	N	N	Y	N	N	Y
Fiber optic cables[f]									
88Y6851	A1DS	1m LC-LC Fiber Cable (networking)	Y	Y	Y	Y	Y	Y	Y
88Y6854	A1DT	5m LC-LC Fiber Cable (networking)	Y	Y	Y	Y	Y	Y	Y
88Y6857	A1DU	25m LC-LC Fiber Cable (networking)	Y	Y	Y	Y	Y	Y	Y

a. Two feature codes: x-config and e-config. One feature code: x-config only.
b. Replaces 41Y8522.
c. Replaces 46M6071.
d. Requires Cisco OneX Converter Module, part number 88Y6066.
e. Available from Cisco Systems or Cisco Systems reseller.
f. For SFP and SFP+ modules with LC connectors.

1.4.2 Fibre Channel switches

Support for transceivers and cables for Fibre Channel switch modules is shown in Table 1-18.

Table 1-18 Modules and cables that are supported in Fibre Channel I/O modules

Part number	Feature codes[a]	Description / Part numbers	Brocade 8Gb FC 42C1828 44X1920 44X1921	Cisco 4Gb FC 39Y9280 44E5696 39Y9284 44E5692	QLogic 8Gb FC 44X1905 44X1907 88Y6406 88Y6410 46M6172
8 Gb transceivers					
44X1962	5084 / None	Brocade 8Gb SFP+ SW Optical Transceiver	Yes	No	No
44X1964	5075 / 3286	8Gb SFP+ SW Optical Transceiver	No	No	Yes
45W0500	None / 2801	SFP Transceiver 8Gbps SW	Yes	No	No
45W1216	None / 2821	SFP Transceiver 8Gbps 10 km LW	Yes	No	No
4 Gb transceivers					
39R6475	4804 / 3238	4Gb SFP Transceiver Option	No	No	Yes
22R4902	None / 2410	4Gbps SW SFP Transceiver	No	No	Yes
26K7941	None	Short Wave 4Gb SFP pair	No	No	Yes
22R4897	None / 2414	4Gbps SW SFP Transceiver 4 Pack	No	No	Yes
23R1703	None	4Gb 4km LW SFP	No	No	Yes
23R1704	None	4Gb 4km LW SFP - 4 Pack	No	No	Yes
45W0493	None / 2401	SFP Transceiver 4Gbps SW	Yes	No	No
45W0494	None / 2441	SFP Transceiver 4Gbps 4Km LW	Yes	No	No
45W0495	None / 2411	SFP Transceiver 4Gbps 10Km LW	Yes	No	No
45W0499	None / 2480	SFP Transceiver 4Gbps 30Km ELW	Yes	No	No
41Y8598	4864	Cisco Systems 4Gb SWL SFP Module	No	Yes	No
Fiber optic cables					
39M5696	3703 / None	1M Fiber Optic Cable LC-LC	Yes	Yes	Yes
39M5697	3704 / None	5M Fiber Optic Cable LC-LC	Yes	Yes	Yes
39M5698	3705 / None	25M Fiber Optic Cable LC-LC	Yes	Yes	Yes

a. Two feature codes: x-config and e-config.

1.4.3 InfiniBand switches

Support for transceivers and cables for InfiniBand switch modules is shown in Table 1-19.

Compliant cables: The Voltaire 40Gb InfiniBand Switch Module supports all cables that are compliant to the InfiniBand Architecture specification.

Table 1-19 Modules and cables that are supported in InfiniBand I/O modules

Part number	Feature codes[a]	Description	Voltaire 40Gb InfiniBand
		Part number	46M6005
49Y9980	3866 / 3249	IB QDR 3m QSFP Cable Option (passive)	Yes

a. Two feature codes: x-config and e-config.

1.5 Chassis power modules

Table 1-20 shows the compatibility information for the BladeCenter chassis power modules.

Table 1-20 Power supply module option part numbers

Part number	Feature code	Description	BC S	BC E	BC H	BC HT DC	BC HT AC	BC T DC	BC T AC
43W3582[g]	1992	950W/1450W Auto-Sensing Power Supplies 3 and 4[a]	Y	N	N	N	N	N	N
46C7438	2102	C14 950W/1450W Auto-Sensing Power Supplies 3 and 4[b]	Y	N	N	N	N	N	N
39M4675	2105	BladeCenter E 2000W Power Supply Modules[c]	N	Y	N	N	N	N	N
46M0508	2106	BladeCenter E 2320W Power Supply Option[a,d]	N	Y	N	N	N	N	N
68Y6601	2143	BladeCenter H 2980W AC Power Modules (2) with Fan Packs	N	N	Y	N	N	N	N
42C5279	1984	BladeCenter HT DC Power Supply Option[e]	N	N	N	Y	N	N	N
42C5280	1983	BladeCenter HT AC Power Supply Option[f]	N	N	N	N	Y	N	N
32R0833[g]	1958	BladeCenter T 1300W DC Power Supply Option[h]	N	N	N	N	N	Y	N
32R0834[g]	1960	BladeCenter T 1300W AC Power Supply Option[i]	N	N	N	N	N	N	Y

a. This option ships with two 2.5 m IEC 320 C19 - C20 power jumper cords.
b. This option ships with two 2.0 m IEC 320 C13 - C14 power jumper cords.
c. This option contains two power supplies and two IEC 320-C19 to C20 power cables.
d. This option requires the advanced management module.
e. This option contains two DC power supplies with fan packs.
f. This option contains two AC power supplies with fan packs and two 2.8 m C19/C20 power cables.
g. Withdrawn; not available for ordering.
h. This option contains two power supplies.
i. This option contains two power supplies and two IEC 320-C13 to C14 power cables.

Table 1-21 summarizes the power module functions in BladeCenter E.

Table 1-21 BladeCenter E power module functions

Power supply bays	Power module function
1 and 2	Provides power to all modules and to blade bays 1 - 6.
3 and 4	Provides power to blade bays 7 - 14.

Table 1-22 summarizes the devices that are powered by power modules in BladeCenter H.

Table 1-22 Devices that are powered by each power module in BladeCenter H

Devices[a]	Power module 1	Power module 2	Power module 3	Power module 4
Blades 1 - 7	Yes	Yes		
Blades 8 - 14			Yes	Yes
I/O modules 1 and 2 (SM 1 and 2)[b]	Yes	Yes	Yes	Yes
I/O modules 3 and 4 (SM 3 and 4/BM 3 and 4)	Yes	Yes		
I/O modules 5 and 6 (BM 1 and 2)			Yes	Yes
I/O modules 7 and 8 (HSSM 1 and 3)	Yes		Yes	
I/O modules 9 and 10 (HSSM 2 and 4)		Yes		Yes
Management modules[b]	Yes	Yes	Yes	Yes

a. SM = switch module, BM = bridge module, and HSSM = high speed switch module.
b. The two management modules and I/O modules 1 and 2 are powered by any power module.

Table 1-23 summarizes the power module functions in BladeCenter HT.

Table 1-23 Devices that are powered by power modules in BladeCenter HT

Power module bays	Power module function
1 and 2	Provides power to management modules 1 and 2, I/O modules 1 - 4, and to blade bays 1 - 6
3 and 4	Provides power to high-speed I/O modules 7 - 10, and blade bays 7 - 12

Table 1-24 summarizes the power module functions for BladeCenter T.

Table 1-24 Power module functions for BladeCenter T

Power module bays	Power module function
1 and 2	Provides power to ► I/O bays 1 and 2 ► Blade bays 1 through 4 ► Both management module bays ► Media tray
3 and 4	Provides power to ► I/O bays 3 and 4 ► Blade bays 4 through 8

1.6 Rack to chassis

Table 1-25 lists the BladeCenter chassis that are supported in each rack cabinet.

Table 1-25 The chassis that are supported in each rack cabinet

Part number	Rack cabinet	BC S	BC E	BC H	BC HT	BC T
201886X	11U Office Enablement Kit	Yes	Yes	Yes	No	Yes
93061RX	NetBAY11 Standard Rack Cabinet	Yes	Yes	No	Yes	Yes
9306420	NetBAY42 Standard Rack Cabinet	No	Yes	No	No	Yes
9306421	NetBAY42 Standard Expansion Rack Cabinet	No	Yes	No	No	Yes
93061RX	NetBAY11 Standard Rack Cabinet	Yes	Yes	No	Yes	Yes
93072PX	25U Static S2 Standard Rack	Yes	Yes	Yes	Yes	Yes
93072RX	25U Standard Rack	Yes	Yes	Yes	Yes	No
93072SX	25U Standard Rack	No	Yes	No	No	No
93074EX	42U Standard Rack Extension	No	Yes	No	No	No
93074RX	42U Standard Rack	Yes	Yes	Yes	Yes	No
93074SX	42U Standard Rack	No	Yes	No	No	No
93074XX	42U Standard Rack Extension	Yes	Yes	Yes	Yes	No
930842E	NetBAY42 Enterprise Expansion Rack Cabinet	No	Yes	No	No	Yes
930842S	NetBAY42 Enterprise Rack Cabinet	No	Yes	No	No	Yes
93084EX	42U Enterprise Expansion Rack	Yes	Yes	Yes	Yes	Yes
93084PX	42U Enterprise Rack	Yes	Yes	Yes	Yes	Yes
93084RX	NetBAY42 Enterprise Rack Cabinet	Yes	Yes	No	Yes	Yes
93084XX	NetBAY42 Enterprise Expansion Rack Cabinet	Yes	Yes	No	Yes	Yes
93604EX	42U 1200mm Deep Dynamic Expansion Rack	Yes	Yes	Yes	Yes	Yes
93604PX	42U 1200mm Deep Dynamic Rack	Yes	Yes	Yes	Yes	Yes
93614EX	42U 1200mm Deep Static Expansion Rack	Yes	Yes	Yes	Yes	Yes
93614PX	42U 1200mm Deep Static Rack	Yes	Yes	Yes	Yes	Yes
93624EX	47U 1200mm Deep Static Expansion Rack	Yes	Yes	Yes	Yes	Yes
93624PX	47U 1200mm Deep Static Rack	Yes	Yes	Yes	Yes	Yes
93634CX	PureFlex System 42U Rack	Yes	Yes	Yes	No	No
93634DX	PureFlex System 42U Expansion Rack	Yes	Yes	Yes	No	No
93634EX	42U 1100mm Dynamic Expansion Rack	Yes	Yes	Yes	Yes	Yes
93634PX	42U 1100mm Dynamic Rack	Yes	Yes	Yes	Yes	Yes
99564RX	S2 42U Dynamic Standard Rack	Yes	Yes	Yes	Yes	Yes
99564XX	S2 42U Dynamic Standard Expansion Rack	Yes	Yes	Yes	Yes	Yes

2

Blade server component compatibility

This chapter lists the compatibility of components that are installed internally to each blade server.

The following sections are described:

2.1 I/O adapter to blade interoperability

The different form factors are supported in the blade servers, as listed in Table 2-1.

Table 2-1 Blade support matrix for expansion card form factors

Blade	Type	CFFv	CIOv	CFFh
HS12	8028	Yes	No	Yes
HS22	7870	No	Yes	Yes
HS22V	7871	No	Yes	Yes
HS23	7875, E5-2600	No	Yes	Yes
HS23	7875, E5-2600 v2	No	Yes	Yes
HS23E	8038	No	Yes	Yes
HX5	7872	No	Yes	Yes
HX5	7873	No	Yes	Yes
PS700/1/2	8406-7xx	No	Yes	Yes
PS703/4	7891-73X 7891-74X	No	Yes	Yes

Table 2-2 lists the available I/O adapters and their compatibility with the blade servers.

Table 2-2 The expansion cards that are supported in each blade server

Expansion cards (Y = supported, N = not supported)	Part number	Feature code[a]	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/4 (7891)
Ethernet expansion cards												
Integrated 2-port Gigabit Ethernet	None	None	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ethernet Expansion Card (CFFv)	39Y9310	2969	Y	N	N	N	N	N	N	N	N	N
Ethernet Expansion Card (CIOv)	44W4475	1039 / 8243	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
2/4 Port Ethernet Exp. Card (CFFh)	44W4479	5476 / 8291	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mellanox 2-port 10Gb Ethernet (CFFh)	90Y3570	A1NW	N	Y	Y	Y	Y	N	Y	N	N	N
Broadcom 10Gb Gen2 4-pt Eth. (CFFh)	46M6164	0098	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Broadcom 10Gb Gen2 2-pt Eth. (CFFh)	46M6168	0099	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Broadcom 2-pt 10Gb VFA (CFFh)	81Y3133	A1QR	N	Y	Y	Y	Y	Y	Y	Y	N	N
Emulex Virtual Fabric Adapter	49Y4235	5755	N	Y	Y	N	N	N	Y	Y	N	N
Emulex Virtual Fabric Adapter Adv.	49Y4275	2435	N	Y	Y	N	N	N	Y	Y	N	N

Expansion cards (Y = supported, N = not supported)	Part number	Feature code[a]	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/4 (7891)
Emulex Virtual Fabric Adapter II	90Y3550	A1XG	N	Y	Y	N	N	Y[b]	Y	Y	N	N
Emulex Virtual Fabric Adapter Adv. II	90Y3566	AIXH	N	Y	Y	N	N	Y[b]	Y	Y	N	N
Emulex Virtual Fabric Adapter II	00Y3266	A3NV	N	Y	Y	N	N	Y	Y	Y	N	N
Emulex Virtual Fabric Adapter Adv. II	00Y3264	A3NW	N	Y	Y	N	N	Y	Y	Y	N	N
Emulex 10GbE Virtual Fabric Adv. Upg.[c]	49Y4265	2436	N	Y	Y	N	N	Y	Y	Y	N	N
Emulex 10GbE VFA II for HS23	81Y3120	A287	N	N	N	Y	Y	N	N	N	N	N
Emulex 10GbE VFA Adv. II for HS23	90Y9332	A2ZN	N	N	N	Y	Y	N	N	N	N	N
Virtual Fabric Advanced FOD Upgr.[d]	90Y9350	A2ZP	N	N	N	Y	Y	N	N	N	N	N
QLogic 2-port 10Gb CNA (CFFh)	42C1830	3592 / 8275	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
QLogic 2-port 10Gb CNA (CFFh)	00Y3280[e]	A3JB / 8275	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
QLogic 10Gb Virtual Fabric Adapter	00Y3332	A4AC	N	N	N	Y	Y	Y	Y	Y	N	N
QLogic 10Gb Virtual Fabric CNA	00Y5618	A4AD	N	N	N	Y	Y	Y	Y	Y	N	N
QLogic 10Gb VF Adv. FoD Upgrade[f]	00Y5622	A4AE	N	N	N	Y	Y	Y	N	N	N	N
Intel 10Gb 2-port Ethernet (CFFh)	42C1810	3593	N	Y	Y	Y	Y	Y	Y	Y	N	N
Brocade 2-port 10Gb CNA (CFFh)	81Y1650	5437	N	Y	Y	Y	Y	Y	Y	Y	N	N
Interposer cards and onboard 10Gb Ethernet upgrades												
10Gb Interposer Card for HS23	94Y8550	A244	N	N	N	Y	Y	N	N	N	N	N
Virtual Fabric Adv. Sw. Upg. (LOM)[g]	90Y9310	A2TD	N	N	N	Y	Y	N	N	N	N	N
Fibre Channel expansion cards												
Emulex 8Gb FC (CIOv)	46M6140	3598 / 8240	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
QLogic 4Gb FC (CFFv)	41Y8527	2970	Y	N	N	N	N	N	N	N	N	N
QLogic 4Gb FC (CIOv)	46M6065	3594 / 8241	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
QLogic 8Gb FC (CIOv)	44X1945	1462 / 8242	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
QLogic Ethernet and 8Gb FC (CFFh)	44X1940	5485 / 8271	Y	Y	Y	Y	N	Y	Y	Y	Y[h]	Y[h]
QLogic Ethernet and 8Gb FC (CFFh)	00Y3270[i]	A3JC / 8271	Y	Y	Y	Y	Y	Y	Y	Y	Y[h]	Y[h]
InfiniBand expansion cards												
4X InfiniBand DDR (CFFh)	43W4423	2991	Y	Y	Y	N	N	N	N	N	Y	N
2-port 40Gb InfiniBand (CFFh)	46M6001	0056 / 8272	Y	Y	Y	Y	Y	Y	Y	Y	N	Y

Expansion cards (Y = supported, N = not supported)	Part number	Feature code[a]	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/4 (7891)
SAS expansion cards												
SAS Connectivity Card (CFFv)	43W3974	1591	Y	N	N	N	N	N	N	N	N	N
SAS Expansion Card (CFFv)	39Y9190	2979	Y	N	N	N	N	N	N	N	N	N
SAS Expansion Card (CFFv)	44E5688[j]	A3J9	Y	N	N	N	N	N	N	N	N	N
SAS Connectivity Card (CIOv)	43W4068	1041 / 8246	N	Y	Y	Y	Y	N	Y[k]	Y[k]	Y	Y
ServeRAID MR10ie (CIOv)	46C7167	5752 / 8257	Y[l]	Y	Y	N	N	N	N	N	N	N
ServeRAID H1135 Controller (CIOv)	90Y4750	A1XJ	N	N	N	N	N	Y	N	N	N	N
SSD Expansion Card for HX5	46M6908	5765	N	N	N	N	N	N	Y	Y	N	N

a. Two feature codes: x-config and e-config. One feature code: x-config.
b. Supported only when factory-installed.
c. Upgrades 49Y4235 to support iSCSI. Upgrades 90Y3550 and 00Y3266 to support iSCSI and FCoE.
d. Upgrades 81Y3120 to support iSCSI and FCoE.
e. Replaces 42C1830.
f. Upgrades 00Y3332 to support iSCSI and FCoE.
g. Upgrades integrated dual-port 10 Gb network interface card (NIC) on the HS23 to support iSCSI and FCoE.
h. Ethernet support requires IBM AIX V6.1 TL6 SP5, AIX V7.1 SP3, IBM i 6.1, IBM i 7.1, VIOS 2.2.0.12-FP24 SP02, or later levels.
i. Replaces 44X1940.
j. Replaces 39Y9190.
k. Requires SSD Expansion Card, part number 46M6908.
l. Requires SAS Connectivity Card, part number 43W3974.

2.2 Memory DIMM compatibility

This section covers memory DIMMs for both blade server families. The following topics are described:

- 2.2.1, “x86 blade servers” on page 29
- 2.2.2, “Power Systems blade servers” on page 32

2.2.1 x86 blade servers

Table 2-3 lists the memory dual inline memory module (DIMM) options for the x86 blade servers.

Table 2-3 Supported memory DIMMs: x86 blade servers

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870, 5500)	HS22 (7870, 5600)	HS22V (7871, 5500)	HS22V (7871, 5600)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
1866 MHz DDR3 RDIMMs												
46W0688	A4G0	4GB (1x4GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
46W0696	A4G1	8GB (1x8GB, 1Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
46W0704	A4G2	8GB (1x8GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
46W0712	A4G3	16GB (1x16GB, 2Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
1600 MHz DDR3 RDIMMs												
46W0684	A4FV	4GB (1x4GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
90Y3147	A1S0	4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	Y	N	Y	N	N
46W0692	A4FW	4GB (1x4GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
90Y3148	A1S1	4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	Y	N	Y	N	N
46W0700	A4FX	8GB (1x8GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
00D4989	A3BV	8GB (1x8GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	Y	N	Y	N	N
90Y3149	A1S2	8GB (1x8GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	Y	N	Y	N	N

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870, 5500)	HS22 (7870, 5600)	HS22V (7871, 5500)	HS22V (7871, 5600)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
46W0708	A4FY	8GB (1x8GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	N	Y	N	N	N
00D4993	A3BW	8GB (1x8GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	Y	N	Y	N	N
46W0716	A4G9	16GB (1x16GB, 2Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	Y	Y	N	N	N
90Y3157	A3BS	16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	N	N	N	N	N	Y	N	Y	N	N
1333 MHz DDR3 RDIMMs												
44T1485	0038	1GB (1x1GB) Single Rank PC3-10600 CL9 ECC DDR3-1333 VLP RDIMM	N	Y	N	Y	N	N	N	N	N	N
49Y1427	8928	1GB (1x1GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	N	N	N	N	N
44T1486	1916	2GB (1x2GB) Dual Rank PC3-10600 CL9 ECC DDR3-1333 VLP RDIMM	N	Y	N	Y	N	N	N	N	Y	N
44T1487	0039	2GB (1x2GB) Single Rank PC3-10600 CL9 ECC DDR3-1333 VLP RDIMM	N	Y	Y	Y	Y	N	N	N	N	N
46C0561	3890	2GB (1x2GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	N	Y	N	Y	N	N	N	N	N
49Y1429	8930	2GB (1x2GB, 1Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	N	N	N	N	N
46C0560	A0WX	2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	Y	N	Y	N	Y
44T1594	A0YV	2GB (1x2GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	N	N	N	N	N
49Y1428	8929	2GB (1x2GB, 2Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	N	N	N	N	N
44T1488	0040	4GB (1x4GB) Dual Rank PC3-10600 CL9 ECC DDR3-1333 VLP RDIMM	N	Y	N	Y	N	N	N	N	N	N
46C0563	A0WY	4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	Y	N	Y	N	N
46C0567	3891	4GB (1x4GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	N	Y	N	Y	N	N	N	N	N
49Y1430	8931	4GB (1x4GB, 2Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	N	N	N	N	N

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870, 5500)	HS22 (7870, 5600)	HS22V (7871, 5500)	HS22V (7871, 5600)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
46C0564	A0WZ	4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	Y	N	Y	N	Y
44T1596	1908	4GB (1x4GB, 2Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	N	N	N	Y	N
00D4981	A3BT	8GB (1x8GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	N	Y	N	Y	Y	N	Y	N	N
46C0568	8644	8GB (1x8GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	Y	N	Y	N	N
49Y1431	8932	8GB (1x8GB, 2Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	Y	Y	Y	N	N	N	N	N
49Y1555	A13Q	8GB (1x8GB, 2Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	N	N	N	N	N	N	N	Y	N
00D4985	A3BU	8GB (1x8GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	N	Y	N	Y	Y	N	Y	N	Y
46C7451	1910	8GB (1x8GB, Dual Rankx4) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	Y	N	Y	N	N	N	N	N	N
46C0599	2422	16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	N	Y	N	Y	Y	N	Y	N	Y
00D5008	A3KN	32GB (1x32GB, 4Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	N	N	N	N	N	Y	Y	N	N	Y
1066 MHz DDR3 RDIMMs												
44T1579	1911	8GB (1x8GB) Dual Rank PC3-8500 CL7 ECC DDR3-1066 VLP RDIMM	N	Y	N	Y	N	N	N	N	N	N
46C0569	3892	8GB (1x8GB, 2Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz VLP RDIMM	N	N	Y	N	Y	N	N	N	N	N
46C0570	A17Q	8GB (1x8GB, 4Rx8, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz VLP RDIMM	N	N	N	N	N	N	N	N	N	Y
46C7499	1917	8GB (1x8GB, 4Rx8, 1.5V) PC3-8500 CL7 ECC DDR3 1066MHz VLP RDIMM	N	N	N	N	N	N	N	N	Y	N
90Y3221	A2QP	16GB (1x16GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz VLP RDIMM	N	N	N	Y[a]	Y[a]	N	N	Y	N	Y[b]
667 MHz DDR2 RDIMMs												
39M5861	1927	1GB (2x512MB Kit) PC2-5300 CL5 ECC DDR2 SDRAM VLP RDIMMs	Y	N	N	N	N	N	N	N	N	N
39M5864	1928	2GB (2x1GB Kit) PC2-5300 CL5 ECC DDR2 SDRAM VLP RDIMMs	Y	N	N	N	N	N	N	N	N	N

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870, 5500)	HS22 (7870, 5600)	HS22V (7871, 5500)	HS22V (7871, 5600)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
46C0522	3969	2GB (2x1GB) PC2-5300 CL5 ECC DDR2 667 VLP RDIMM	Y	N	N	N	N	N	N	N	N	N
46C0512	3947	4GB (2x2GB) PC2-5300 CL5 ECC DDR2 667MHz SR VLP RDIMM	Y	N	N	N	N	N	N	N	N	N
46C0513	3970	8GB (2x4GB) PC2-5300 CL5 ECC DDR2 667 VLP RDIMM	Y	N	N	N	N	N	N	N	N	N

a. Up to 12 quad-rank modules are supported in HS22V.
b. Not supported in MAX5.

2.2.2 Power Systems blade servers

Table 2-4 lists the supported memory DIMMs for IBM Power Systems blade servers.

Table 2-4 Supported memory DIMMs: Power Systems blade servers

e-config feature	Description	PS700/1/2 (8406)	PS703/4 (7891)
8208	8GB (2x4GB DIMMs) DDR3 1066 MHz System Memory	Yes	No
8209	16GB (2x8GB DIMMs) DDR3 1066 MHz System Memory	Yes	No
8196	8GB (2x4GB DIMMs) DDR3 1066 MHz System Memory	No	Yes
8199	16GB (2x8GB DIMMs) DDR3 1066 MHz System Memory	No	Yes
EM34	32GB (2x16GB VLP DIMMs) DDR3 1066 MHz System Memory	No	Yes

2.3 Internal storage compatibility

This section covers supported internal storage for both blade server families. The following topics are described:

- 2.3.1, “x86 blade servers” on page 33
- 2.3.2, “Power Systems blade servers” on page 36

2.3.1 x86 blade servers

Table 2-5 lists the drives for Lenovo x86 blade servers.

Table 2-5 Supported SAS and SATA drives

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
2.5-inch 10K SAS hard disk drives										
43W7535	5577	73GB 10K SAS 2.5" SFF Slim-HS HDD	Y	Y	N	N	N	N	N	N
43W7536	5578	146GB 10K SAS 2.5" SFF Slim-HS HDD	Y	Y	N	N	N	N	N	N
42D0632	5537	146GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	Y	Y	N	N	N	N	N	N
43W7670	5595	300GB 10K SATA 2.5" Slim-HS HDD	Y	Y	N	N	N	N	N	N
90Y8877	A2XC	300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	N	Y	N	Y	Y	Y	N	N
42D0637	5599	300GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	Y	Y	N	Y	N	Y	N	N
90Y8872	A2XD	600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	N	Y	N	Y	Y	Y	N	N
49Y2003	5433	600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	Y	Y	N	Y	N	Y	N	N
00AJ300	A4VB	600GB 15K 6Gbps SAS 2.5" G2HS HDD	N	Y	N	Y	Y	Y	N	N
81Y9650	A282	900GB 10K 6Gbps SAS 2.5" SFF HS HDD	Y	Y	N	Y	Y	Y	N	N
00AD075	A48S	1.2TB 10K 6Gbps SAS 2.5" G2HS HDD	N	Y	N	Y	Y	Y	N	N
00NA441	ASCD	1.8TB 10K 6Gbps SAS 2.5" G2HS 512e HDD	N	N	N	Y	Y	N	N	N
2.5-inch 15K SAS hard disk drives										
43W7545	5579	73GB 15K SAS 2.5" SFF Slim-HS HDD	Y	Y	N	N	N	N	N	N
42D0672	5522	73GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	Y	Y	N	N	N	N	N	N
90Y8926	A2XB	146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	N	Y	N	Y	Y	Y	N	N
42D0677	5536	146GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	Y	Y	N	Y	N	Y	N	N
81Y9670	A283	300GB 15K 6Gbps SAS 2.5" SFF HS HDD	Y	Y	N	Y	Y	Y	N	N

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
2.5-inch SAS hybrid hard disk drives										
00AD102	A4G7	600GB 10K 6Gbps SAS 2.5" G2HS Hybrid	N	Y	N	Y	Y	Y	N	N
2.5-inch NL SAS hard disk drives										
90Y8953	A2XE	500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	N	Y	N	Y	Y	Y	N	N
42D0707	5409	500GB 7200 6Gbps NL SAS 2.5" SFF HS HDD	Y	Y	N	Y	N	Y	N	N
81Y9690	A1P3	1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	Y	Y	N	Y	Y	Y	N	N
2.5-inch NL SATA hard disk drives										
42D0747	5405	160GB 7200 NL SATA 2.5" SFF Slim-HS HDD	Y	Y	N	N	N	N	N	N
81Y9722	A1NX	250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	Y	Y	N	Y	Y	Y	N	N
42D0752	5407	500GB 7200 NL SATA 2.5" SFF Slim-HS HDD	Y	Y	N	N	N	N	N	N
81Y9726	A1NZ	500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	Y	Y	N	Y	Y	Y	N	N
81Y9730	A1AV	1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	Y	Y	N	Y	Y	Y	N	N
2.5-inch solid-state drives - Enterprise										
00W1125	A3HR	100GB SATA 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N
43W7718	A2FN	200GB SATA 2.5" MLC HS SSD	N	Y	N	Y	N	Y	N	N
49Y6129	A3EW	200GB SAS 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N
49Y6134	A3EY	400GB SAS 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N
49Y6139	A3F0	800GB SAS 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N
49Y6195	A4GH	1.6TB SAS 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N
41Y8331	A4FL	S3700 200GB SATA 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N
41Y8336	A4FN	S3700 400GB SATA 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N
41Y8341	A4FQ	S3700 800GB SATA 2.5" MLC HS Enterprise SSD	N	Y	N	Y	Y	Y	N	N

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
1.8-inch solid-state drives - Enterprise										
43W7726	5428	50GB SATA 1.8" MLC SSD	N	N	Y	N	N	N	Y	Y
43W7734	5314	50GB SATA 1.8" NHS SSD	N	N	Y	N	N	N	Y	Y
00W1120	A3HQ	100GB SATA 1.8" MLC Enterprise SSD	N	N	Y	N	N	N	Y	Y
43W7746	5420	200GB SATA 1.8" MLC SSD	N	N	Y	N	N	N	Y	Y
49Y6119	A3AN	200GB SATA 1.8" MLC Enterprise SSD	N	N	Y	N	N	N	Y	Y
49Y6124	A3AP	400GB SATA 1.8" MLC Enterprise SSD	N	N	Y	N	N	N	Y	Y
41Y8366	A4FS	S3700 200GB SATA 1.8" MLC Enterprise SSD	N	N	N	N	N	N	Y	Y
41Y8371	A4FT	S3700 400GB SATA 1.8" MLC Enterprise SSD	N	N	N	N	N	N	Y	Y
2.5-inch solid-state drives - Enterprise value										
49Y5839	A3AS	64GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00AJ355	A56Z	120GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
90Y8648	A2U4	128GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00AJ360	A570	240GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00FN298	AS0D	240GB SATA 2.5" MLC HS Entry SSD	N	Y	N	Y	Y	Y	N	N
90Y8643	A2U3	256GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00AJ365	A571	480GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00FN327	AS0E	480GB SATA 2.5" MLC HS Entry SSD	N	Y	N	Y	Y	Y	N	N
49Y5844	A3AU	512GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00AJ370	A572	800GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00FN332	AS0F	960GB SATA 2.5" MLC HS Entry SSD	N	Y	N	Y	Y	Y	N	N
00AJ000	A4KM	S3500 120GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00AJ005	A4KN	S3500 240GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00AJ010	A4KP	S3500 480GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00AJ015	A4KQ	S3500 800GB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N
00FN268	A5U4	S3500 1.6TB SATA 2.5" MLC HS Enterprise Value SSD	N	Y	N	Y	Y	Y	N	N

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
1.8-inch Solid-state drives - Enterprise value										
49Y5834	A3AQ	64GB SATA 1.8" MLC Enterprise Value SSD	N	N	Y	N	N	N	N	N
00W1222	A3TG	128GB SATA 1.8" MLC Enterprise Value SSD	N	N	Y	N	N	N	N	N
00W1227	A3TH	256GB SATA 1.8" MLC Enterprise Value SSD	N	N	Y	N	N	N	N	N
49Y5993	A3AR	512GB SATA 1.8" MLC Enterprise Value SSD	N	N	Y	N	N	N	N	N
00AJ040	A4KV	S3500 80GB SATA 1.8" MLC Enterprise Value SSD	N	N	Y	N	N	N	N	Y
00AJ045	A4KW	S3500 240GB SATA 1.8" MLC Enterprise Value SSD	N	N	Y	N	N	N	N	Y
00AJ050	A4KX	S3500 400GB SATA 1.8" MLC Enterprise Value SSD	N	N	Y	N	N	N	N	Y

2.3.2 Power Systems blade servers

Local storage options for Power Systems blade servers are shown in Table 2-6.

Table 2-6 Local storage options for Power Systems blade servers

e-config feature	Description	PS700/PS701/ PS702 (8406)	PS7703/PS704 (7891)
2.5 inch SAS HDDs			
8274	300GB 10K RPM non-hot-swap 6Gbps SAS	Yes	Yes
8276	600GB 10K RPM non-hot-swap 6Gbps SAS	Yes	Yes
1.8 inch SSDs			
8207	177GB SATA non-hot-swap SSD	No	Yes

2.4 Embedded virtualization

The x86 blade servers support a Lenovo USB flash drive (USB Memory Key) option that is preinstalled with a customized version of the VMware vSphere hypervisor. It is fully contained on the flash drive, without requiring any disk space.

Table 2-7 lists the ordering information for the VMware hypervisor options.

Table 2-7 USB Memory Key for VMware hypervisors

Part number	x-config feature	Description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
41Y8278	1776	USB Memory Key for VMware ESXi 4	N	Y	Y	N	N	N	Y	Y
41Y8287	3033	USB Memory Key for VMware ESXi 4.1	N	Y	Y	N	N	Y	Y	Y
41Y8296	A1NP	USB Memory Key for VMWare ESXi 4.1 Update 1	N	Y	Y	N	N	N	Y	Y
41Y8300	A2VC	USB Memory Key for VMWare ESXi 5.0	N	Y	Y	Y	Y	Y	Y	Y
41Y8307	A383	USB Memory Key for VMWare ESXi 5.0 Update 1	N	Y	Y	Y	Y	N	Y	Y
41Y8311	A2R3	USB Memory Key for VMWare ESXi 5.1	N	Y	Y	Y	Y	Y	Y	Y
41Y8382	A4WZ	USB Memory Key for VMWare ESXi 5.1 Update 1	N	Y	N	Y	Y	Y	N	Y
41Y8385	A584	USB Memory Key for VMWare ESXi 5.5	N	Y	N	Y	Y	Y	Y	Y
41Y8298	A2G0	Blank USB Memory Key for VMWare ESXi Downloads	N	Y	Y	Y	Y	Y	Y	Y

You can use the Blank USB Memory Key, 41Y8298, to use any supported Lenovo customized version of the VMware hypervisor. The VMware vSphere hypervisor with Lenovo customizations can be downloaded from the following website:

http://ibm.com/systems/x/os/vmware/esxi

2.5 Expansion unit compatibility

This section describes the expansion units and the components that are compatible with each:

2.5.1 Blade servers

Table 2-8 lists the expansion units and their compatibility with blade servers.

Table 2-8 Expansion blades and supported blade servers

Part number	Feature code	Expansion unit	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
43W4391	4339	PCI Express I/O Expansion Unit (PCIe)	Y	Y	Y	N	N	N	N	N
46M6730	9295	PCI Express Gen 2 Expansion Blade (PCIe Gen 2)	N	Y	N	N	N	Y	Y[a]	Y[a]
68Y7484	A247	PCI Express Gen 2 Expansion Blade II (PCIe Gen 2 II)	N	Y	N	Y	Y	Y	Y[a]	Y[a]
81Y4103	5090	GPU Expansion Blade with NVIDIA Tesla M2070	N	Y	N	N	N	N	N	N
46M6771	A25F	GPU Expansion Blade with NVIDIA Tesla M2075	N	Y	N	N	N	Y	N	N
46M6772	A10R	GPU Expansion Blade with NVIDIA Tesla M2070Q	N	Y	N	N	N	Y	N	N
68Y7479	A246	GPU Expansion Blade II with NVIDIA Tesla M2070Q	N	Y	N	Y	Y	Y	N	N
68Y7478	A245	GPU Expansion Blade II with NVIDIA Tesla M2075	N	Y	N	Y	Y	Y	N	N
00D6881	A2VW	GPU Expansion Blade II with NVIDIA Tesla M2090	N	Y	N	Y	Y	Y	N	N

a. HX5 with MAX5 is not supported.

Power Systems blade servers: PS700/PS701/PS702 (8406) and PS703/PS704 (7891) blade servers do not support the blade expansion units.

2.5.2 CFFh I/O adapter to expansion unit compatibility

The PCI Express (PCIe) Expansion Units support the Combo Form Factor horizontal (CFFh) adapters that are listed in Table 2-9 on page 39.

Power Systems blade servers: Consult the ServerProven® site for the current list of expansion cards that are supported in the PCIe Expansion Units:

http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/eserver.html

Table 2-9 CFFh I/O adapter compatibility matrix: expansion units

Part number	Expansion cards (Y = supported, N = not supported)	Expansion Unit				
		PCIe	PCIe Gen 2	PCIe Gen 2 II	GPU	GPU II
Ethernet expansion cards						
44W4479	2/4 Port Ethernet Exp. Card (CFFh)	No	Yes	Yes	Yes	Yes
90Y3570	Mellanox 2-port 10Gb Ethernet (CFFh)	No	No	Yes	No	No
46M6164	Broadcom 10Gb Gen2 4-pt Eth. (CFFh)	No	Yes	Yes	Yes	Yes
46M6168	Broadcom 10Gb Gen2 2-pt Eth. (CFFh)	No	Yes	Yes	Yes	Yes
81Y3133	Broadcom 2-pt 10Gb VFA (CFFh)	No	No	No	No	No
49Y4235	Emulex Virtual Fabric Adapter	No	Yes	Yes	Yes	Yes
49Y4275	Emulex Virtual Fabric Adapter Advanced	No	Yes	Yes	Yes	Yes
90Y3550	Emulex Virtual Fabric Adapter II	No	Yes	Yes	Yes	Yes
90Y3566	Emulex Virtual Fabric Adapter Adv. II	No	Yes	Yes	Yes	Yes
00Y3266	Emulex Virtual Fabric Adapter II	No	Yes	Yes	Yes	Yes
00Y3264	Emulex Virtual Fabric Adapter Adv. II	No	Yes	Yes	Yes	Yes
81Y3120	Emulex 10GbE VFA II for HS23	No	No	No	No	No
90Y9332	Emulex 10GbE VFA Adv. II for HS23	No	No	No	No	No
42C1830	QLogic 2-port 10Gb CNA (CFFh)	No	Yes	Yes	No	No
00Y3280	QLogic 2-port 10Gb CNA (CFFh)[a]	No	Yes	Yes	No	No
00Y3332	QLogic 10Gb Virtual Fabric Adapter	No	Yes	Yes	Yes	Yes
00Y5618	QLogic 10Gb Virtual Fabric CNA	No	Yes	Yes	Yes	Yes
42C1810	Intel 10Gb 2-port Ethernet (CFFh)	No	No	No	No	No
81Y1650	Brocade 2-port 10Gb CNA (CFFh)	No	Yes	Yes	No	Yes
Fibre Channel expansion cards						
44X1940	QLogic Ethernet and 8Gb FC (CFFh)	No	Yes	Yes	No	No
00Y3270[b]	QLogic Ethernet and 8Gb FC (CFFh)	No	Yes	Yes	No	No
InfiniBand expansion cards						
43W4423	4X InfiniBand DDR (CFFh)	No	Yes	No	No	No
46M6001	2-port 40Gb InfiniBand (CFFh)	No	Yes	Yes	Yes	Yes

a. Replaces 42C1830.
b. Replaces 44X1940.

2.5.3 PCIe I/O adapters to PCIe Expansion Unit compatibility

Table 2-10 lists the supported PCIe adapters.

Table 2-10 Supported PCIe adapters

Part number	Feature code	PCIe adapter	Expansion Unit		
			PCIe	PCIe Gen 2	PCIe Gen 2 II
PCIe SSD MLC Adapters					
46C9078	A3J3	365GB High IOPS MLC Mono Adapter	No	No	Yes
46C9081	A3J4	785GB High IOPS MLC Mono Adapter	No	No	Yes
90Y4377	A3DY	1.2TB High IOPS MLC Mono Adapter	No	No	Yes
90Y4397	A3DZ	2.4TB High IOPS MLC Duo Adapter	No	No	Yes
Modular PCIe SSD Adapters					
90Y4361	A3MZ	300GB High IOPS MLC Modular Adapter	No	No	Yes
90Y4365	A3N0	600GB High IOPS MLC Modular Adapter	No	No	Yes
90Y4369	A3N1	800GB High IOPS MLC Modular Adapter	No	No	Yes
90Y4373	A3N2	300GB High IOPS SLC Modular Adapter	No	No	Yes
Enterprise Value io3 Flash Adapters					
00AE983	ARYK	1250GB Enterprise Value io3 Flash Adapter	No	No	Yes
00AE986	ARYL	1600GB Enterprise Value io3 Flash Adapter	No	No	Yes
00AE989	ARYM	3200GB Enterprise Value io3 Flash Adapter	No	No	Yes
00AE992	ARYN	6400GB Enterprise Value io3 Flash Adapter	No	No	Yes
Enterprise io3 Flash Adapters					
00AE995	ARYP	1000GB Enterprise io3 Flash Adapter	No	No	Yes
00AE998	ARYQ	1300GB Enterprise io3 Flash Adapter	No	No	Yes
00JY001	ARYR	2600GB Enterprise io3 Flash Adapter	No	No	Yes
00JY004	ARYS	5200GB Enterprise io3 Flash Adapter	No	No	Yes
Other adapters					
43W4324	3569	Ultra 320 SCSI Controller PCIe	Yes	No	No
43W4339	3559	ServeRAID-MR10M SAS/SATA Controller	Yes	No	No
39Y6066	1485	NetXtreme II 1000 Express Ethernet Adapter	Yes	No	No
39Y6136	2974	PRO/1000 PT Quad Port Server Adapter by intel	Yes	No	No

2.6 PCIe SSD adapter to blade compatibility

Table 2-11 lists the PCIe SSD adapters and their compatibility with blade servers.

PCIe SSD adapters: PCIe SSD adapters must be installed in a supported PCIe expansion blade (see Table 2-8 on page 38).

Table 2-11 PCIe SSD adapters and supported blade servers

Part number	Feature code	Expansion unit	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)
PCIe SSD MLC Adapters										
46C9078	A3J3	365GB High IOPS MLC Mono Adapter	N	N	N	Y	Y	Y	N	Y
46C9081	A3J4	785GB High IOPS MLC Mono Adapter	N	N	N	Y	Y	Y	N	Y
90Y4377	A3DY	1.2TB High IOPS MLC Mono Adapter	N	N	N	Y	Y	Y	N	Y
90Y4397	A3DZ	2.4TB High IOPS MLC Duo Adapter	N	N	N	Y	Y	Y	N	Y
Modular PCIe SSD Adapters										
90Y4361	A3MZ	300GB High IOPS MLC Modular Adapter	N	N	N	Y	Y	N	N	N
90Y4365	A3N0	600GB High IOPS MLC Modular Adapter	N	N	N	Y	Y	N	N	N
90Y4369	A3N1	800GB High IOPS MLC Modular Adapter	N	N	N	Y	Y	N	N	N
90Y4373	A3N2	300GB High IOPS SLC Modular Adapter	N	N	N	Y	Y	N	N	N
Enterprise Value io3 Flash Adapters										
00AE983	ARYK	1250GB Enterprise Value io3 Flash Adapter	N	N	N	Y	Y	N	N	N
00AE986	ARYL	1600GB Enterprise Value io3 Flash Adapter	N	N	N	Y	Y	N	N	N
00AE989	ARYM	3200GB Enterprise Value io3 Flash Adapter	N	N	N	Y	Y	N	N	N
00AE992	ARYN	6400GB Enterprise Value io3 Flash Adapter	N	N	N	Y	Y	N	N	N
Enterprise io3 Flash Adapters										
00AE995	ARYP	1000GB Enterprise io3 Flash Adapter	N	N	N	Y	Y	N	N	N
00AE998	ARYQ	1300GB Enterprise io3 Flash Adapter	N	N	N	Y	Y	N	N	N
00JY001	ARYR	2600GB Enterprise io3 Flash Adapter	N	N	N	Y	Y	N	N	N
00JY004	ARYS	5200GB Enterprise io3 Flash Adapter	N	N	N	Y	Y	N	N	N

3

Software compatibility

This chapter describes aspects of software compatibility.

The following topics are described:

3.1 Operating system support

This section contains compatibility information for BladeCenter blades and operating systems. Operating systems are grouped by vendor and then by operating system version. All operating systems that support the current product line of blade servers are listed in the following tables. The information represents a snapshot of ServerProven at the time of writing. Visit the ServerProven website for the latest information at the following website:

http://www.ibm.com/servers/eserver/serverproven/compat/us/nos/ematrix.shtml

Unless it is otherwise specified, updates or service packs equal to or higher within the same operating system release family and version of the operating system are also supported. However, support for newer major versions is not supported unless specifically identified.

For customers interested in deploying operating systems that are not listed here, Lenovo can provide customers with server hardware-only warranty support. For operating system and software support, customers must contact the operating system vendor or community. Customers must obtain the operating system and OS software support directly from the operating system vendor or community. For more information, see “Additional OS Information” on the ServerProven web page.

The information in Table 3-1 through Table 3-6 on page 49 is for general purposes. See the ServerProven website for any additional information and limitations.

The operating systems that are described here include:

- “Microsoft” on page 44
- “SUSE Linux” on page 46
- “Red Hat Linux” on page 47
- “Oracle Solaris” on page 48
- “VMware” on page 49
- “IBM” on page 49

Microsoft

Table 3-1 summarizes support for operating systems from Microsoft.

Table 3-1 Supported Microsoft operating systems

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
Microsoft Windows Server 2012 R2										
All Editions	N	Y	N	Y	Y	Y	N	Y	N	N
Microsoft Windows Server 2012										
All Editions	N	Y	Y	Y	Y	Y	Y	Y	N	N

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
Microsoft Windows Server 2008 R2										
All Editions	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Microsoft Windows Server 2008 x64										
Foundation	Y	N	N	N	N	N	N	N	N	N
Web Edition	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Standard Edition	Y	Y	Y	Y	Y	N	Y	Y	N	N
Enterprise Edition	Y	Y	Y	Y	Y	Y	Y	Y	N	N
DataCenter Edition	N	Y	Y	Y	Y	Y	Y	Y	N	N
HPC Edition	N	Y	Y	N	N	Y	Y	Y	N	N
HPC Server 2008	N	Y	N	Y	Y	N	N	N	N	N
Microsoft Windows Server 2008 x86										
Web Edition	Y	Y	Y	N	N	N	N	N	N	N
Standard Edition	Y	Y	Y	N	N	N	N	N	N	N
Enterprise Edition	Y	Y	Y	N	N	N	N	N	N	N
DataCenter Edition	N	Y	Y	N	N	N	N	N	N	N
Microsoft Windows Essentials Business Server 2008										
Standard Edition	Y	Y	Y	N	N	N	N	N	N	N
Premium Edition	Y	Y	Y	N	N	N	N	N	N	N
Microsoft Windows Small Business Server 2008										
Standard Edition	Y	Y	Y	Y	N	N	Y	Y	N	N
Premium Edition	Y	Y	Y	Y	N	N	Y	Y	N	N
Microsoft Windows Server 2003/2003 R2 x64										
Standard Edition	Y	Y	N	N	N	N	N	N	N	N
Enterprise Edition	Y	Y	N	N	N	N	N	N	N	N
Enterprise Edition with MSCS	N	Y	N	N	N	N	N	N	N	N
DataCenter Edition	N	Y	N	N	N	N	N	N	N	N
Compute Cluster Edition	Y	Y	N	N	N	N	N	N	N	N
Compute Cluster Server 2003	Y	Y	N	N	N	N	N	N	N	N

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
Microsoft Windows Server 2003/2003 R2										
Web Edition	Y	Y	N	N	N	N	N	N	N	N
Standard Edition	Y	Y	N	N	N	N	N	N	N	N
Enterprise Edition	Y	Y	N	N	N	N	N	N	N	N
Enterprise Edition with MSCS	N	Y	N	N	N	N	N	N	N	N
DataCenter Edition	N	Y	N	N	N	N	N	N	N	N
Windows Small Business Server 2003/2003 R2										
Standard Edition	Y	Y	N	N	N	N	N	N	N	N
Premium Edition	Y	Y	N	N	N	N	N	N	N	N

SUSE Linux

Table 3-2 summarizes support for SUSE Linux operating systems.

Table 3-2 Supported SUSE Linux operating systems

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
SUSE Linux Enterprise Server 12										
SLES 12 with Xen	N	N	N	Y	Y	Y	N	Y	N	N
SLES 12	N	N	N	Y	Y	Y	N	Y	N	N
SUSE Linux Enterprise Server 11										
Real Time for AMD64/EM64T	N	Y	Y	N	N	N	N	N	N	N
With Xen for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y	Y	N	N
For AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y	Y	N	N
For x86	Y	Y	Y	Y	Y	Y	N	N	N	N
For IBM POWER	N	N	N	N	N	N	N	N	Y	Y

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
SUSE Linux Enterprise Server 10										
Real Time for AMD64/EM64T	N	Y	Y	N	N	N	N	N	N	N
With Xen for AMD64/EM64T	Y	Y	Y	N	N	N	N	N	N	N
With Xen for x86	Y	Y	Y	N	N	N	N	N	N	N
For AMD64/EM64T	Y	Y	Y	Y	N	Y	Y	Y	N	N
For x86	Y	Y	N	Y	N	N	N	N	N	N
For IBM POWER	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 9										
For AMD64/EM64T	Y	N	N	N	N	N	N	N	N	N
For x86	Y	N	N	N	N	N	N	N	N	N

Red Hat Linux

Table 3-3 summarizes support for Red Hat Linux operating systems from Red Hat.

Table 3-3 Supported Red Hat Linux operating systems

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
Red Hat Enterprise Linux 7										
Red Hat Enterprise Linux 7	N	N	N	Y	Y	Y	Y	Y	N	N
Red Hat Enterprise Linux 6										
Server x64 Edition	N	Y	Y	Y	Y	Y	Y	Y	N	N
Server Edition	N	Y	N	Y	Y	Y	N	N	N	N

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
Red Hat Enterprise Linux 5										
Server x64 Edition	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Server with Xen x64 Edition	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Server Edition	Y	Y	N	Y	Y	Y	N	N	N	N
Server with Xen Edition	Y	Y	Y	N	N	N	N	N	N	N
For IBM POWER	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 4										
AS for AMD64/EM64T	Y	Y	Y	N	N	N	N	N	N	N
AS for x86	Y	Y	N	N	N	N	N	N	N	N
ES for AMD64/EM64T	Y	Y	Y	N	N	N	N	N	N	N
ES for x86	Y	Y	N	N	N	N	N	N	N	N
WS/HPC for AMD64/EM64T	Y	Y	Y	N	N	N	N	N	N	N
WS/HPC for x86	Y	Y	N	N	N	N	N	N	N	N
Red Hat Enterprise MRG Realtime (x64)										
MRG 1.0 Realtime (x64)	N	Y	Y	N	N	N	N	N	N	N
MRG 2.0 Realtime (x64	N	Y	Y	N	N	N	Y	Y	N	N

Oracle Solaris

Table 3-4 summarizes support for Solaris operating systems from Oracle.

Table 3-4 Supported Oracle Solaris operating systems

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
Solaris 10	N	Y	Y	Y	N	N	Y	Y	N	N

VMware

Table 3-5 summarizes support for VMware operating systems from VMware.

Table 3-5 Supported VMware operating systems

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
VMware vSphere 5.5 (ESXi)	N	Y	N	Y	Y	Y	Y	Y	N	N
VMware vSphere 5.1 (ESXi)	N	Y	Y	Y	Y	Y	Y	Y	N	N
VMware vSphere 5.0 (ESXi)	Y	Y	Y	Y	N	Y	Y	Y	N	N
VMware ESX 4.1	Y	Y	Y	Y	N	Y	Y	Y	N	N
VMware ESXi 4.1	Y	Y	Y	Y	N	Y	Y	Y	N	N
VMware ESX 4.0	Y	Y	Y	N	N	N	N	N	N	N
VMware ESXi 4.0	Y	Y	Y	N	N	N	N	N	N	N
VMware ESX 3.5	Y	Y	Y	N	N	N	N	N	N	N
VMware ESXi 3.5	Y	Y	Y	N	N	N	N	N	N	N

IBM

Table 3-6 summarizes support for the IBM AIX and IBM i5/OS operating systems.

Table 3-6 Supported IBM AIX and i5/OS operating systems

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
IBM AIX 5L V5.3	N	N	N	N	N	N	N	N	Y	N
IBM AIX V6.1	N	N	N	N	N	N	N	N	Y	Y
IBM AIX V7.1	N	N	N	N	N	N	N	N	N	Y
IBM i Operating System 6.1	N	N	N	N	N	N	N	N	Y	Y
IBM i Operating System 7.1	N	N	N	N	N	N	N	N	Y	Y
IBM Virtual I/O Server	N	N	N	N	N	N	N	N	Y	Y
4690 Operating System V6	Y	N	N	Y	N	N	N	N	N	N

Toshiba

Table 3-7 summarizes support for the Toshiba operating systems.

Table 3-7 Supported Toshiba operating systems

Operating system	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875, E5-2600)	HS23 (7875, E5-2600 v2)	HS23E (8038)	HX5 (7872)	HX5 (7873)	PS700/1/2 (8406)	PS703/704 (7891)
Toshiba 4690 Operating System V6	N	N	N	Y	N	N	N	N	N	N

3.2 Fabric Manager support

Table 3-8 lists the chassis, servers, and options that support Fabric Manager.

Note: BladeCenter Open Fabric™ Manager (BOFM) reached End of Life and is no longer supported. It has been replaced by Fabric Manager.

Table 3-8 Fabric Manager support matrix: chassis, blade servers, and expansion cards

Description (Yes = supported, No = not supported)	Machine type or part number	Feature code	Fabric Manager support
Chassis			
BladeCenter E	8677	N/A	Yes
BladeCenter H	8852	N/A	Yes
BladeCenter S	8886	N/A	Yes
BladeCenter T	8720, 8730	N/A	Yes
BladeCenter HT	8740, 8750	N/A	Yes
Blade servers			
BladeCenter HS22	7870	N/A	Yes
BladeCenter HS22V	7871	N/A	Yes
BladeCenter HS23	7875	N/A	Yes
BladeCenter HS23E	8038	N/A	Yes
BladeCenter HX5	7872	N/A	Yes
BladeCenter HX5	7873	N/A	Yes
BladeCenter HS12	8028	N/A	Yes
BladeCenter PS700/701/702[a]	8406	N/A	Yes
BladeCenter PS703/704[a]	7891	N/A	Yes

Description (Yes = supported, No = not supported)	Machine type or part number	Feature code	Fabric Manager support
Ethernet expansion cards			
Integrated Gigabit Ethernet	None	None	Yes
10Gb Interposer Card for HS23	94Y8550	A244	Yes
Ethernet Expansion Card (CFFv)	39Y9310	2969	Yes
Ethernet Expansion Card (CIOv)	44W4475	1039	Yes
2/4 Port Ethernet Exp. Card (CFFh)	44W4479	5476	Yes
QLogic 2-port 10Gb CNA (CFFh)	42C1830	3592	Yes
QLogic 2-port 10Gb CNA (CFFh)	00Y3280	A3JB	Yes
Broadcom 10Gb Gen 2 4-pt. Eth. (CFFh)	46M6164	0098	Yes
Broadcom 10Gb Gen 2 2-pt. Eth. (CFFh)	46M6168	0099	Yes
Broadcom 2-port 10Gb VFA (CFFh)	81Y3133	A1QR	Yes
Emulex Virtual Fabric Adapter (CFFh)	49Y4235	5755	Yes
Emulex Virtual Fabric Adpt. Adv. (CFFh)	49Y4275	2435	Yes
Emulex Virtual Fabric Adapter II (CFFh)	90Y3550	A1XG	Yes
Emulex Virt. Fabric Adpt. Adv. II (CFFh)	90Y3566	AIXH	Yes
Emulex 10GbE VFA II for HS23	81Y3120	A287	Yes
Emulex 10GbE VFA Adv. II for HS23	90Y9332	A2ZN	Yes
Intel 10Gb 2-port Ethernet (CFFh)	42C1810	3593	No
Brocade 2-port 10Gb CNA (CFFh)	81Y1650	5437	No
QLogic 10Gb Virtual Fabric Adapter	00Y3332	A4AC	Yes
QLogic 10Gb Virtual Fabric CNA	00Y5618	A4AD	Yes
Fibre Channel expansion cards			
Emulex 8Gb FC (CIOv)	46M6140	3598	Yes
QLogic 4Gb FC (CFFv)	41Y8527	2970	Yes
QLogic 4Gb FC (CIOv)	46M6065	3594	Yes
QLogic 8Gb FC (CIOv)	44X1945	1462	Yes
QLogic Ethernet and 8Gb FC (CFFh)	44X1940	5485	Yes
QLogic Ethernet and 8Gb FC (CFFh)	00Y3270	A3JC	Yes
SAS expansion cards			
SAS Expansion Card (CFFv)	39Y9190	2979	Yes
SAS Expansion Card (CFFv)	44E5688	A3J9	Yes
SAS Connectivity Card (CIOv)	43W4068	1041	Yes
ServeRAID MR10ie (CIOv)	46C7167	5752	No

Description (Yes = supported, No = not supported)	Machine type or part number	Feature code	Fabric Manager support
ServeRAID H1135 (CIOv)	90Y4750	A1XJ	No

a. IFM is not supported for SAS adapters on PSxxx blades. Fabric Manager management of Fibre Channel (FC) boot targets is not supported on PSxxx blades. When configuring a code spare, FC targets can be pre-assigned in the boot list using SMS menus.

I/O modules:

- Any I/O module that is compatible with the chassis and expansion card can be used with Fabric Manager.
- No InfiniBand adapters or I/O modules are supported by Fabric Manager.

3.2.1 Supported operating systems

Fabric Manager is supported on selected Microsoft Windows and Linux operating systems on x86 architecture. Table 3-9 lists the operating system compatibility information for Fabric Manager.

Table 3-9 Operating system support for Fabric Manager

OS Description (Yes = supported, No = not supported)	Fabric Manager support
Microsoft Windows 2008 R2 (64-bit)	Yes (up to SP1)
Microsoft Windows 2008 (32/64-bit)	Yes (SP1 and SP2)
Microsoft Windows 2003 R2 (32/64-bit)	Yes (SP1 and SP2)
Microsoft Windows 2003 (32/64-bit)	Yes (SP1 and SP2)
RHEL 6 (32/64-bit)	Yes (up to SP3)
RHEL 5 (32/64-bit)	Yes (up to SP5)
RHEL 4 (32/64-bit)	No
SLES 11 (32/64-bit)	Yes (up to SP2)
SLES 10 (32/64-bit)	Yes (up to SP2)
SLES 10 with Xen Kernel (32/64-bit)	No
SLES 9 (32/64-bit)	No

The operating systems that Fabric Manager supports are listed in the Flex System Information Center at the following website:

http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.iofm.doc/dw1li_supported_os.html

Fabric Manager supports the following web browsers:

- Internet Explorer 8
- Internet Explorer 9
- Firefox 17 Extended Support Release (ESR)

4

Storage interoperability

This chapter describes storage subsystem compatibility.

The following topics are described:

Tip: Use these tables only as a starting point. All possible combinations might not be supported. Configuration support *must* be verified through the System Storage Interoperation Center (SSIC). See this website:

`http://ibm.com/systems/support/storage/ssic/interoperability.wss`

The tables in this chapter and in the SSIC are used primarily to document Fibre Channel SAN and Fibre Channel over Ethernet-attached (FCoE-attached) block storage interoperability. Also described is Internet Small Computer System Interface (iSCSI) storage when hardware iSCSI initiator host adapters are used.

4.1 Unified NAS storage

Network File System (NFS), Common Internet File System (CIFS), and iSCSI protocols on storage products such as IBM N series, IBM Storwize V7000 Unified, and Scale Out Network Attached Storage are supported by BladeCenter based on the requirements including operating system levels.

See the following interoperability documentation that is provided for the preceding products for specific support:

- N series interoperability:

  http://ibm.com/support/docview.wss?uid=ssg1S7003897

- IBM Storwize V7000 Unified

  http://ibm.com/support/docview.wss?uid=ssg1S1003911

- Scale Out Network Attached Storage

  http://pic.dhe.ibm.com/infocenter/sonasic/sonas1ic/index.jsp?topic=%2Fcom.ibm.sonas.doc%2Fovr_nfssupportmatrix.html

Software iSCSI: Generally, iSCSI is supported by all types of storage if software iSCSI initiators are used on the servers that run supported OS and device driver levels.

4.2 Fibre Channel over Ethernet support

This section lists BladeCenter FCoE support using Fibre Channel targets. The following topics are covered:

- 4.2.1, “Emulex adapters in x86 blade servers” on page 55
- 4.2.2, “Brocade and QLogic adapters in x86 blade servers” on page 56
- 4.2.3, “Power Systems servers” on page 58

Tip: Use these tables only as a starting point. All possible combinations might not be supported. Configuration support *must* be verified through the SSIC website:

http://ibm.com/systems/support/storage/ssic

4.2.1 Emulex adapters in x86 blade servers

Table 4-1 lists FCoE support using Fibre Channel targets for Emulex Virtual Fabric Adapters that are installed in supported Lenovo x86 blade servers.

Table 4-1 FCoE support using FC targets: Emulex Virtual Fabric Adapters

Ethernet adapter	BladeCenter I/O module	FC Forwarder (FCF)	SAN fabric	Operating systems	FC storage targets
► Emulex Virtual Fabric Adapter II 90Y3550[a] ► Emulex Virtual Fabric Adapter II Advanced, 90Y3566 ► Emulex 10GbE VFA II for HS23, 81Y3120[b,c] ► Emulex 10GbE VFA Advanced II for HS23, 90Y9332[c] ► Integrated 10GbE LOM (HS23), 94Y8550[d]	► Brocade Converged 10GbE Switch Module, 69Y1909 (pNIC, vNIC2)		► None[e]	► RHEL 5, 6 ► SLES 11 ► vSphere 4.1, 5.0, 5.1 ► Windows Server 2008 R2, 2012, 2012 R2	► DCS3700 ► DS3500 ► DS5000 ► DS8000 ► SVC ► V3500 ► V3700 ► V5000 ► V7000 ► XIV
			► IBM B-type ► Brocade		
	► Cisco Nexus 4001I Switch Module, 46M6071 (pNIC, vNIC2)	► Cisco Nexus 5010 ► Cisco Nexus 5020 ► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS		
	► 10Gb Ethernet Pass-thru Module, 46M6181 (pNIC, vNIC2)	► Brocade VDX 6730[f]	► IBM B-type		
		► G8264CS[g] (NPV)	► IBM B-type ► Cisco MDS		
		► G8264CS[h] (Full Fabric)	► None[i]		
	► Virtual Fabric 10Gb Switch Module, 46C7191 (pNIC, vNIC1, vNIC2)	► QLogic Virtual Fabric Extension Module, 46M6172[j]	► None[k]	► RHEL 5, 6 ► SLES 10, 11 ► vSphere 4.1, 5.0, 5.1[l] ► Windows Server 2008 R2, 2012, 2012 R2[m]	► DCS3700 ► DS3500 ► DS5000 ► DS8000[n] ► SVC ► V3500 ► V3700 ► V5000 ► V7000 ► XIV[n] ► Tape[n]
			► IBM B-type ► Cisco MDS		
		► Cisco Nexus 5010 ► Cisco Nexus 5020 ► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS[o]		
		► Brocade VDX 6730[p]	► IBM B-type[o]		

a. Requires an Advanced Upgrade, part number 49Y4265.
b. Requires an Advanced Upgrade, part number 90Y9350.
c. Not supported with the Brocade Converged 10GbE Switch Module.
d. Requires an Advanced Upgrade, part number 90Y9310.
e. When in Full Fabric mode, Brocade Converged 10GbE Switch Module supports direct connections to the DS3500 and DS5000 FC storage targets.
f. The configuration with the Brocade VDX supports RHEL 6, SLES 11, vSphere 5.0, and Windows Server 2008 R2.
g. The configuration with the G8264CS in NPV mode supports RHEL 6, SLES 11, vSphere 5.0, vSphere 5.1, and Windows Server 2012.
h. The configuration with the G8264CS in Full Fabric mode supports RHEL 6, SLES 11, vSphere 5.0 and 5.1, and Windows Server 2012 R2.
i. Supports direct FC connectivity to the V7000.
j. Supports external IBM B-type, Brocade, or Cisco MDS SANs only in Intelligent Pass-thru (N-Port ID Virtualization (NPIV)) mode.
k. When in Full Fabric mode, the QLogic VFE supports direct connections to the FC storage targets.
l. vSphere 5.1 is not supported in the configurations with the QLogic VFE.
m. Windows Server 2012 R2 is not supported in the configurations with the QLogic VFE.
n. Not supported in the configurations with the QLogic VFE operating in Full Fabric mode.
o. The configuration does not support tapes.
p. The configuration with the Brocade VDX supports RHEL 6, SLES 11, vSphere 5.0, and Windows Server 2008 R2.

4.2.2 Brocade and QLogic adapters in x86 blade servers

Table 4-2 lists FCoE support using Fibre Channel targets for Brocade and QLogic Converged Network Adapters that are installed in supported x86 blade servers.

Table 4-2 FCoE support using FC targets: Brocade and QLogic Converged Network Adapters

Ethernet adapter	BladeCenter I/O module	FC Forwarder (FCF)	SAN fabric	Operating systems	FC storage targets
► Brocade 2-port 10GbE Converged Network Adapter, 81Y1650	► Brocade Converged 10GbE Switch Module, 69Y1909		► IBM B-type ► Brocade	► RHEL 5 ► RHEL 6 ► SLES 10 ► SLES 11 ► Windows Server 2008 R2 ► Windows Server 2012	► DS3500 ► DS5000
	► 10Gb Ethernet Pass-thru Module, 46M6181	► Brocade 8000 ► IBM Converged Switch B32	► IBM B-type ► Brocade		
		► Cisco Nexus 5010 ► Cisco Nexus 5020	► Cisco MDS		
► QLogic 2-port 10Gb Converged Network Adapter, 42C1830	► 10Gb Ethernet Pass-thru Module, 46M6181	► Brocade 8000 ► IBM Converged Switch B32	► IBM B-type ► Brocade	► RHEL 5 ► RHEL 6 ► SLES 10 ► SLES 11 ► vSphere 4.1[b] ► vSphere 5.0[b] ► Windows Server 2008 R2 ► Windows Server 2012[a]	► DCS3700[b] ► DS3500 ► DS5000 ► DS8000 ► SVC ► V3500[b] ► V3700[b] ► V5000 ► V7000 ► XIV ► Tape[c]
		► Cisco Nexus 5010 ► Cisco Nexus 5020	► Cisco MDS		
	► Brocade Converged 10GbE Switch Module, 69Y1909		► IBM B-type ► Brocade		
	► Cisco Nexus 4001I Switch Module, 46M6071	► Cisco Nexus 5010 ► Cisco Nexus 5020 ► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS		
	► Virtual Fabric 10Gb Switch, 46C7191	► QLogic Virtual Fabric Extension Module, 46M6172[d]	► IBM B-type ► Brocade ► Cisco MDS	► RHEL 5 ► RHEL 6[e] ► SLES 10 ► SLES 11 ► vSphere 4.1[e] ► Windows Server 2008 R2	► DS3500 ► DS5000 ► DS8000 ► SVC ► V5000 ► V7000 ► XIV ► Tape[f]
		► Cisco Nexus 5010 ► Cisco Nexus 5020 ► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS	► RHEL 5[g] ► RHEL 6 ► SLES 10[g] ► SLES 11 ► vSphere 4.1[g] ► vSphere 5.0 ► Windows Server 2008 R2	► DCS3700 ► DS3500 ► DS5000 ► DS8000 ► SVC ► V3500 ► V3700 ► V7000 ► XIV
		► Brocade VDX 6730	► IBM B-type		

a. Supported in the configurations with the Ethernet Pass-thru Module and DS3500 and DS5000 FC storage targets.
b. Only supported in the configurations with the Cisco Nexus 4001I Switch Module.
c. Tapes are not supported with vSphere 4.1 and vSphere 5.0.
d. Supported in Intelligent Pass-thru (NPIV) mode only.
e. Not supported with the DS3500 and DS5000 FC storage targets.
f. Tapes are not supported with vSphere 4.1.
g. Not supported in the configurations with the Brocade VDX 6730.

Table 4-3 lists FCoE support using Fibre Channel targets for QLogic Virtual Fabric Converged Network Adapters that are installed in supported x86 blade servers.

Table 4-3 FCoE support using FC targets: QLogic Virtual Fabric Converged Network Adapters

Ethernet adapter	BladeCenter I/O module	FC Forwarder (FCF)	SAN fabric	Operating systems	FC storage targets
► QLogic 10Gb Virtual Fabric Adapter, 00Y3332[a] ► QLogic 10Gb Virtual Fabric CNA, 00Y5618	► 10Gb Ethernet Pass-thru Module, 46M6181	► G8264CS (NPV mode)	► IBM B-type ► Cisco MDS	► RHEL 5, 6 ► SLES 11 ► vSphere 4.1[b], 5.0, 5.1 ► Windows Server 2008 R2, 2012, 2012 R2[c]	► DCS3700 ► DS3500 ► DS5000 ► DS8000 ► SVC ► V3500 ► V3700 ► V7000 ► XIV
		► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS		
	► Brocade Converged 10GbE Switch Module, 69Y1909		► IBM B-type ► Brocade		
	► Virtual Fabric 10Gb Switch, 46C7191	► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS		

a. Requires QLogic 10Gb Virtual Fabric Advanced FoD Upgrade, part number 00Y5622.
b. vSphere 4.1 is not supported in the configurations with the 10Gb Ethernet Pass-thru Module.
c. Windows Server 2012 R2 is not supported in the configurations with the Brocade Converged 10GbE Switch.

4.2.3 Power Systems servers

Table 4-4 lists FCoE support using Fibre Channel targets for Converged Network Adapters that are installed in supported Power Systems blade servers.

Table 4-4 FCoE support using FC targets: Power Systems blade servers

Ethernet adapter	BladeCenter I/O module	FC Forwarder (FCF)	SAN fabric	Operating systems	FC storage targets
► QLogic 2-port 10Gb Converged Network Adapter, FC 8275	► Brocade Converged 10GbE Switch Module, 69Y1909[a]		► None[b]	► AIX 5.3 ► AIX 6.1 ► AIX 7.1 ► RHEL 5 ► RHEL 6 ► SLES 10 ► SLES 11 ► VIOS 2.1[c] ► VIOS 2.2	► DS3500 ► DS5000 ► DS8000 ► SVC ► V5000[d] ► V7000 ► XIV ► Tape
			► IBM b-type ► Brocade		
	► 10Gb Ethernet Pass-thru Module, 46M6181	► IBM Converged Switch B32 ► Brocade 8000	► IBM b-type ► Brocade		
		► Cisco Nexus 5010 ► Cisco Nexus 5020	► Cisco MDS		
	► Cisco Nexus 4001I Switch Module, FC 2241	► Cisco Nexus 5010 ► Cisco Nexus 5020 ► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS	► AIX 6.1 ► AIX 7.1 ► RHEL 5[e] ► RHEL 6 ► SLES10[e,f] ► SLES 11 ► VIOS 2.2[f]	► DCS3700 ► DS3500 ► DS5000 ► DS8000 ► SVC ► V3500 ► V3700 ► V5000[d] ► V7000 ► XIV ► Tape
	► Virtual Fabric 10Gb Switch Module, FC 3248	► QLogic Virtual Fabric Extension Module, 46M6172[g]	► None[h]	► AIX 5.3 ► AIX 6.1 ► AIX 7.1 ► RHEL 5 ► SLES 10 ► SLES 11 ► VIOS 2.2	► DS3500 ► DS5000 ► SVC ► V5000[d]
			► IBM b-type ► Brocade ► Cisco MDS		
		► Cisco Nexus 5010 ► Cisco Nexus 5020 ► Cisco Nexus 5548 ► Cisco Nexus 5596	► Cisco MDS	► AIX 6.1 ► AIX 7.1 ► RHEL 5[e,i] ► RHEL 6 ► SLES10[e,i] ► SLES 11 ► VIOS 2.2	► DCS3700 ► DS3500 ► DS5000 ► DS8000 ► SVC ► V3500 ► V3700 ► V5000[d] ► V7000 ► XIV[i]
		► Brocade VDX 6730	► IBM B-type		

a. Supports NPIV or Full Fabric mode when connected to the external SAN.
b. When in Full Fabric mode, Brocade Converged 10GbE Switch supports direct connections to the FC targets.
c. Not supported in the configurations with the Brocade Converged 10GbE Switch Module, part number 69Y1909.
d. Supports AIX 5.3, 6.1, and 7.1, and VIOS 2.2.
e. Not supported with the DS3500 and DS5000 FC storage targets.
f. Not supported with the tapes.
g. Supports external IBM B-type, Brocade, or Cisco MDS SANs only in Intelligent Pass-thru (NPIV) mode.
h. When in Full Fabric mode, QLogic Virtual Fabric Extension Module supports direct connections to the FC targets.
i. Not supported in the configurations with the Brocade VDX 6730.

4.3 iSCSI support

This section discusses iSCSI support for BladeCenter. The following topics are covered:

- 4.3.1, “Hardware-based iSCSI support” on page 59
- 4.3.2, “iSCSI SAN Boot” on page 60

System Storage Interoperation Center normally only lists support for iSCSI storage attached using hardware iSCSI offload adapters in the servers. BladeCenter servers support any type of iSCSI (1Gb or 10Gb) storage as long as software iSCSI initiator device drivers that meet the storage requirements for the operating system and device driver levels are met.

Tip: Use these tables only as a starting point. All possible combinations might not be supported. Configuration support *must* be verified through the SSIC website:

`http://ibm.com/systems/support/storage/ssic/interoperability.wss`

4.3.1 Hardware-based iSCSI support

Table 4-5 lists iSCSI support using a hardware-based iSCSI initiator.

Table 4-5 Hardware-based iSCSI support

Ethernet adapter	BladeCenter I/O module	External Ethernet switch	Operating systems	iSCSI storage targets
► Emulex Virtual Fabric Adapter II, 90Y3550[a] ► Emulex Virtual Fabric Adapter II Advanced, 90Y3566 ► Emulex 10GbE VFA II for HS23, 81Y3120[b] ► Emulex 10GbE VFA Advanced II for HS23, 90Y9332 ► Integrated 10GbE LOM (HS23)[c]	► Virtual Fabric 10Gb Switch Module, 46C7191 (pNIC, vNIC1, vNIC2)	► Ethernet Switch ► RackSwitch™ G8124E	► RHEL 5, 6 ► SLES 10, 11 ► vSphere 4.0, 5.0, 5.1 ► Windows Server 2008 R2, 2012, 2012 R2	► DCS3700 ► DS3500 ► DS5000 ► SVC ► V3500 ► V3700 ► V5000 ► V7000 ► XIV
► QLogic 10Gb Virtual Fabric Adapter, 00Y3332[d] ► QLogic 10Gb Virtual Fabric CNA, 00Y5618	► Virtual Fabric 10Gb Switch Module, 46C7191 (pNIC, vNIC2)	► Ethernet Switch		

a. Requires an Advanced Upgrade, part number 49Y4265.
b. Requires an Advanced Upgrade, part number 90Y9350.
c. Requires an Advanced Upgrade, part number 90Y9310.
d. Requires QLogic 10Gb Virtual Fabric Advanced FoD Upgrade, part number 00Y5622.

4.3.2 iSCSI SAN Boot

iSCSI SAN Boot for blades enables diskless blades to be booted from an external iSCSI storage system or an IBM System i host by using a standard Ethernet port on the blade server itself or on an Ethernet expansion card that is installed in the blade server.

There are two configuration techniques to perform a SAN Boot for blades using iSCSI:

- Use the basic input/output system (BIOS) and integrated network interface cards (NICs) on the blade itself to configure iSCSI initiators with the iSCSI Configuration Manager (also known as *BladeBoot technology*).
- Use Unified Extensible Firmware Interface (UEFI) to configure iSCSI initiators for both integrated NICs and certain expansion cards.

Table 4-6 lists the currently available blades that support a built-in software iSCSI initiator that is used for diskless blade booting.

Upgrades: BIOS/UEFI, BMC/IMM, and NIC firmware upgrades might be required to support iSCSI boot with onboard Ethernet controllers or Ethernet expansion cards.

Table 4-6 SAN boot support with built-in software iSCSI initiator

Blade server →		HS12 — 8028	HS22 — 7870	HS22 — V 7871	HS23 — 7875	HS23E — 8038	HX5 — 7872	HX5 — 7873	PS700/1/2 — 8406	PS703/4 — 7891
Expansion card	**Part number**									
iSCSI Configuration Manager (BladeBoot)										
Integrated Gigabit Ethernet	None	Y	N	N	N	N	N	N	N	N
2/4 Port Ethernet Card (CFFh)	44W4479	Y	N	N	N	N	N	N	N	N
UEFI										
Integrated Gigabit Ethernet	None	N	Y	Y	Y	Y	Y	Y	N	N
Ethernet Card (CIOv)	44W4475	N	Y	Y	Y	Y	Y	Y	N	N
2/4 Port Ethernet Card (CFFh)	44W4479	N	Y	Y	Y	Y	Y	Y	N	N
Broadcom 10Gb Gen 2 4-port. Ethernet (CFFh)	46M6164	N	Y	Y	Y	Y	Y	Y	N	N
Broadcom 10Gb Gen 2 2-port Ethernet (CFFh)	46M6168	N	Y	Y	Y	Y	Y	Y	N	N

Supported operating systems include:

- RHEL 5
- RHEL 6
- SLES 10
- SLES 11
- Windows Server 2003
- Windows Server 2008

Operating system must also be compatible with the blade server (see 3.1, “Operating system support” on page 44).

4.4 Fibre Channel support

This section describes Fibre Channel support for BladeCenter. The following topics are covered:

Tip: Use these tables only as a starting point. All possible combinations might not be supported. Configuration support *must* be verified through the SSIC web site:

http://ibm.com/systems/support/storage/ssic/interoperability.wss

4.4.1 x86 blade servers

Table 4-7 lists Fibre Channel storage support for x86 blade servers.

Table 4-7 Fibre Channel support: x86 blade servers

FC adapter	BladeCenter I/O module	External SAN fabric[a]	Operating systems	FC storage targets
► Emulex 8Gb FC (CIOv), 46M6140 ► QLogic 4Gb FC (CFFv), 41Y8527 ► QLogic 4Gb FC (CIOv), 46M6065 ► QLogic 8Gb FC (CIOv), 44X1945 ► QLogic Ethernet and 8Gb FC (CFFh), 44X1940 ► QLogic Ethernet and 8Gb FC (CFFh), 00Y3270	► Brocade Enterprise 20-port 8Gb SAN Switch Module, 42C1828 ► Brocade 20-port 8Gb SAN Switch Module, 44X1920 ► Brocade 10-port 8Gb SAN Switch Module, 44X1921 ► QLogic 20-Port 8Gb SAN Switch Module, 44X1905 ► QLogic 20-Port 4/8Gb SAN Switch Module, 88Y6406 ► QLogic 8Gb Intelligent Pass-thru Module, 44X1907 ► QLogic 4/8Gb Intelligent Pass-thru Module, 88Y6410	► IBM b-type ► Brocade ► Cisco MDS ► McDATA ► QLogic	► RHEL 5 ► RHEL 6 ► SLES 10 ► SLES 11 ► vSphere 4.1 ► vSphere 5.0 ► vSphere 5.1 ► Microsoft Windows Server 2003 / 2003 R2 ► Microsoft Windows Server 2008 / 2008 R2 ► Microsoft Windows 2012 / 2012 R2	► DCS3700 ► DS3000 ► DS5000 ► DS8000 ► SVC ► V3500 ► V3700 ► V5000 ► V7000 ► XIV ► Tape ► FlashSystem
	► Cisco 4Gb 20 port FC Switch Module, 39Y9280 ► Cisco 4Gb 20 port FC Switch Module, 44E5696 ► Cisco 4Gb 10 port FC Switch Module, 39Y9284 ► Cisco 4Gb 10 port FC Switch Module, 44E5692	► IBM b-type ► Cisco MDS		

a. External SAN is a mandatory requirement when BladeCenter I/O module operates as a NPIV gateway (if NPIV mode is supported by this module). If an I/O module operates in Full Fabric mode, it supports direct connections to the Fibre Channel storage targets.

4.4.2 Power Systems blade servers

Table 4-8 lists Fibre Channel storage support for Power Systems blade servers.

Table 4-8 Fibre Channel support: Power Systems blade servers

FC expansion card	BladeCenter I/O module	External SAN fabric	Operating systems	FC storage targets
► Emulex 8Gb FC (CIOv), FC 8240 ► QLogic 4Gb FC (CIOv), FC 8241 ► QLogic 8Gb FC (CIOv), FC 8242 ► QLogic Ethernet and 8Gb FC (CFFh), FC 8271	► Brocade Enterprise 20-port 8Gb SAN Switch Module, 42C1828 ► Brocade 20-port 8Gb SAN Switch Module, FC 5869 ► Brocade 10-port 8Gb SAN Switch Module, FC 5045 ► QLogic 20-Port 8Gb SAN Switch Module, FC 3284 ► QLogic 20-Port 4/8Gb SAN Switch Module, 88Y6406 ► QLogic 8Gb Intelligent Pass-thru Module, FC 5449 ► QLogic 4/8 b Intelligent Pass-thru Module, 88Y6410	► IBM b-type ► Brocade ► Cisco MDS	► AIX 5.3 ► AIX 6.1 ► AIX 7.1 ► RHEL 4 ► RHEL 5 ► RHEL 6 ► SLES 10 ► SLES 11 ► VIOS 2.1 ► VIOS 2.2	► DCS3700 ► DS3000 ► DS5000 ► DS8000 ► SVC ► V3500 ► V3700 ► V5000 ► V7000 ► XIV ► Tape ► FlashSystem
	► Cisco 4Gb 20 port FC Switch Module, FC 3242 ► Cisco 4Gb 10 port FC Switch Module, FC 3241	► IBM b-type ► Cisco MDS		

4.4.3 N-Port ID Virtualization support on Power Systems blade servers

Table 4-9 lists N-Port ID Virtualization (NPIV) support on Power Systems blade servers.

Table 4-9 Fibre Channel NPIV support on Power Systems blade servers

	Expansion card	AIX Client			IBM i Client			Linux Client		
Switch module	**Part number or feature code**	**QLogic 8Gb FC (ClOv), FC 8242**	**QLogic Eth. & 8Gb FC (CFFh), FC 8271**	**Emulex 8Gb FC (ClOv), FC 8240**	**QLogic 8Gb FC (ClOv), FC 8242**	**QLogic Eth. & 8Gb FC (CFFh), FC 8271**	**Emulex 8Gb FC (ClOv), FC 8240**	**QLogic 8Gb FC (ClOv), FC 8242**	**QLogic Eth. & 8Gb FC (CFFh), FC 8271**	**Emulex 8Gb FC (ClOv), FC 8240**
Brocade Enterprise 20-port 8Gb SAN SM	42C1828	Y	Y	Y	Y	Y	Y[a]	Y	Y	Y
Brocade 20-port 8Gb SAN Switch Module	FC 5869	Y	Y	Y	Y	Y	Y[a]	Y	Y	Y
Brocade 10-port 8Gb SAN Switch Module	FC 5045	Y	Y	Y	Y	Y	Y[a]	Y	Y	Y
Cisco 4Gb 20 port FC Switch Module	FC 3242	Y	Y	Y	Y	Y	Y[a]	N	N	N
Cisco 4Gb 10 port FC Switch Module	FC 3241	Y	Y	Y	Y	Y	Y[a]	N	N	N
QLogic 20-Port 8Gb SAN Switch Module	FC 3284	Y	Y	N	Y	Y	N	Y	Y	N
QLogic 20-Port 4/8Gb SAN Switch Module	88Y6406	Y	Y	N	Y	Y	N	Y	Y	N
QLogic 8Gb Intelligent Pass-Thru Module	FC 5449	Y	Y	N	N	N	N	N	N	N
QLogic 4/8Gb Intelligent Pass-Thru Module	88Y6410	Y	Y	N	N	N	N	N	N	N

a. Virtual Tape only with VIOS 2.1.2 or later.

4.5 Serial-attached SCSI support

This section describes serial-attached SCSI (SAS) storage support for BladeCenter. The following topics are covered:

Tip: Use these tables only as a starting point. All possible combinations might not be supported. Configuration support *must* be verified through the SSIC website:

`http://ibm.com/systems/support/storage/ssic/interoperability.wss`

4.5.1 External SAS storage

Table 4-10 lists external SAS storage support for blade servers.

Table 4-10 SAS support

SAS expansion card	BladeCenter I/O module	Operating systems	SAS storage targets
► SAS Connectivity Card (CFFv), 43W3974[a] ► SAS Expansion Card (CFFv), 39Y9190 ► SAS Expansion Card (CFFv), 44E5688 ► SAS Connectivity Card (CIOv), 43W4068	► SAS Connectivity Module, 39Y9195	► RHEL 5, 6 ► SLES 10, 11 ► vSphere 4.1, 5.0, 5.1, 5.5 ► Microsoft Windows Server 2003, 2008, 2008 R2	► DCS3700 ► DS3200 ► DS3500 ► System x HH LTO tape[b]
	► SAS RAID Controller Module, 43W3584	► RHEL 5, 6 ► SLES 10, 11 ► Microsoft Windows Server 2003, 2008, 2008 R2	► System Storage Tape
► ServeRAID MR10ie (CIOv), 46C7167	► SAS Connectivity Module, 39Y9195	► RHEL 5, 6 ► SLES 10, 11 ► vSphere 4.1, 5.0 ► Microsoft Windows Server 2003, 2008	► EXP2500 ► EXP3000 ► System Storage Tape ► System x HH LTO tape[b]
► ServeRAID H1135 Controller (CIOv), 90Y4750	► SAS Connectivity Module, 39Y9195	► RHEL 6 ► SLES 10, 11 ► vSphere 5.0	► DCS3700 ► DS3200 ► DS3500
► SAS Connectivity Card (CIOv), FC 8246	► SAS Connectivity Module, FC 3267	► AIX 5.3, 6.1, 7.1 ► RHEL 5 ► SLES 10, 11 ► VIOS 2.2[c]	► DCS3700 ► DS3200 ► DS3500
	► SAS RAID Controller Module, 43W3584	► VIOS 2.1, 2.2[c]	► System Storage Tape

a. Does not support vSphere 5.1 and 5.5.
b. Not supported with vSphere.
c. If you plan to run IBM i as a VIO client on IBM Power Systems blade servers, consider utilizing Fibre Channel for storage connectivity because SAS connectivity might limit storage I/O performance.

4.5.2 SAS RAID Controller support

Table 4-11 lists the storage components for BladeCenter S with the SAS RAID Module.

Table 4-11 Storage solution components for BladeCenter S

Item	Component description	Part number	Feature code	Min/max quantity
1	Disk Storage Module (6 HDDs)	43W3581	4545	1/2
	12-Disk Storage Module	49Y3234	A3KS	1/2
2	SAS RAID Controller Module	43W3584	3734	1[a]/2
3	SAS Expansion Card (CFFv)	39Y9190	2979	1 per blade server
	SAS Connectivity Card (CIOv)	43W4068	1041	1 per blade server
	ServeRAID H1135 (CIOv)[b]	90Y4750	A1XJ	1 per blade server
4	Ethernet Switch in I/O bay 1	Varies	Varies	1/1
5	Supported blade server	Varies	None	1/6

a. Single controller configuration is supported.
b. ServeRAID H1135 is used with HS23E (8038) only.

The following Ethernet switch modules are supported in I/O bay 1:

- 1/10 Gb Uplink Ethernet Switch Module, 44W4404, feature code 6980
- 2/3 Copper Gb Ethernet Switch, 32R1860, feature code 3212
- 2/3 Fiber Gb Ethernet Switch, 32R1861, feature code 3213
- Layer 2/7 Copper Gb Ethernet Switch, 32R1859, feature code 1494
- Cisco Catalyst Switch Module 3012, 43W4395, feature code 3174
- Server Connectivity Module, 39Y9324, feature code 3220
- 10 Gb Uplink Ethernet Switch, 32R1783, feature code 3210
- Intelligent Copper Pass-thru Module, 44W4483, feature code 5865

Considerations:

- Starting with SAS RAID Controller firmware version 1.2.2.007, a single controller configuration is supported.
- Combining a 6-Disk Storage Module and a 12-Disk Storage Module in the same BladeCenter S chassis is supported with SAS RAID Controller firmware version 1.3.1.010 or later.
- The Copper Pass-thru Module (39Y9320, feature code 3219) is not supported by the SAS RAID Controller Module.
- If the Intelligent Copper Pass-thru Module (44W4483, feature code 5865) is used, then ports 7 and 14 *must* be attached to each other by a standard Ethernet cable.

Table 4-12 lists the hard disk drives supported by SAS RAID Controller Modules.

Table 4-12 Hard disk drives supported in DSMs by SAS RAID Controller Modules

Description	Part number	Feature code	Max quantity
3.5-inch Hot-Swap NL SAS (for 6-Disk Storage Module)			
1 TB 7.2 K 6 Gbps NL SAS 3.5-inch HDD	42D0777	5418	12 (6 per one DSM)
2 TB 7.2 K 6 Gbps NL SAS 3.5-inch HDD	42D0767	5417	12 (6 per one DSM)

Description	Part number	Feature code	Max quantity
3.5-inch Hot-Swap SAS (for 6-Disk Storage Module)			
300 GB 15 K 6 Gbps SAS 3.5-inch Hot-Swap HDD	44W2234	5311	12 (6 per one DSM)
450 GB 15 K 6 Gbps SAS 3.5-inch Hot-Swap HDD	44W2239	5312	12 (6 per one DSM)
600 GB 15 K 6 Gbps SAS 3.5-inch Hot-Swap HDD	44W2244	5313	12 (6 per one DSM)
2.5-inch Hot-Swap SAS (for 12-Disk Storage Module)			
900GB 10K 6Gbps SAS 2.5" SFF HS HDD	81Y9650	A282	24 (12 per one DSM)
300GB 15K 6Gbps SAS 2.5" SFF HS HDD	81Y9670	A283	24 (12 per one DSM)
600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8872	A2XD	24 (12 per one DSM)
300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8877	A2XC	24 (12 per one DSM)

The following operating systems are supported by the SAS RAID Controller Modules:

- Microsoft
  - Windows Server 2012
  - Windows Server 2008 R2
  - Windows Server 2008 (x86 and x64)
  - Windows Server 2003 (x86 and x64)
- Red Hat Linux
  - Enterprise Linux 5 (x86 and AMD64/EM64T)
  - Enterprise Linux 6 (x86 and AMD64/EM64T)
- Novell SUSE Linux
  - Enterprise Server 10 (x86 and AMD64/EM64T)
  - Enterprise Server 11 (x86 and AMD64/EM64T)
- VMware
  - ESX Server 3.5
  - ESX/ESXi 4.0
  - ESX/ESXi 4.1
  - vSphere 5.0
  - vSphere 5.1
- IBM
  - AIX 6.1
  - AIX 7.1
  - VIOS 2.2

Consideration: If you plan to run IBM i as a VIO client on IBM Power Systems blade servers, consider utilizing Fibre Channel for storage connectivity because SAS connectivity might limit storage I/O performance.

For more information about the SAS RAID Controller solution, refer to the following resources:

- *SAS RAID Controller Module Interoperability Guide*

  http://ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5078491
- *SAS RAID Controller Module Detailed Host Attachment Guide* (Remote Boot included)

  http://ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5078491

5

Telco and NEBS compliance

This chapter describes aspects of Network Equipment Building System (NEBS) compliance.

The following topics are described:

5.1 Telco blades to telco chassis interoperability

Table 5-1 provides guidance on currently available blade servers that were tested for NEBS Level 3 and ETSI compliance for use in a central office environment. Only certain processors are supported, as listed in Table 5-1.

Table 5-1 Telco blades to telco chassis interoperability

NEBS-compliant blade server	BC HT NEBS3/ETSI (12 blades max)
HS23 (7875)	► E5-2648L (70W/8C) ► E5-2658 (95W/8C)
HS23E (8038)	► E5-2418L (50W/4C) ► E5-2428L (60W/6C) ► E5-2448L (70W/8C)
HX5 (7872)	No
HX5 (7873)	No
PS700/701/702 (8406-70Y/71Y)	► P7 3.0GHz
PS703/704 (7891-73X/74X)	No

5.2 Telco blade options

HS22 options that were tested for NEBS3 and European Telecommunications Standards Institute (ETSI) compliance are shown in Table 5-2.

Table 5-2 HS22 NEBS compliant options

Description	Part number	Feature code
Intel Xeon Processor L5518 4C 2.13GHz 8MB Cache 1066MHz 60W	49Y5052	7748
Intel Xeon Processor L5638 6C 2.0GHz 12MB Cache 1333MHz 60W	68Y8124	0732
Intel Xeon Processor E5620 4C 2.40GHz 12M Cache 1066MHz 80W	59Y5705	4649
2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0560	A0WX
4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0563	A0WY
4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0564	A0WZ
146GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	42D0677	5536
300GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	42D0637	5599
500GB 7200 6Gbps NL SAS 2.5" SFF Slim-HS HDD	42D0707	5409
600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	49Y2003	5433
2/4 Port Ethernet Expansion Card (CFFh) for BladeCenter	44W4479	5476
Broadcom 10Gb 4-port Ethernet Expansion Card (CFFh) for BladeCenter	46M6164	0098
Ethernet Expansion Card (CIOv) for BladeCenter	44W4475	5477
Intel 10Gb 2-port Ethernet Expansion Card (CFFh) for BladeCenter	42C1810	3593
QLogic 8Gb Fibre Channel Expansion Card (CIOv) for BladeCenter	44X1945	1462
BladeCenter PCI Express I/O Expansion Unit	43W4391	4339
PRO/1000 PT Dual Port Server Adapter by Intel	39Y6126	2944
NetXtreme II 1000 Express Ethernet Adapter	39Y6066	1485

HS22V options that were tested for NEBS3 and ETSI compliance are shown in Table 5-3.

Table 5-3 HS22V NEBS compliant options

Description	Part number	Feature code
Intel Xeon Processor E5645 6C 2.40GHz 12MB Cache 1333MHz 80W	69Y4744	7668
Intel Xeon Processor L5638 6C 2.0GHz 12MB Cache 1333MHz 60W	69Y4745	7669
2GB (1x2GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	44T1594	A0YV
2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0560	A0WX
4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0563	A0WY
4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0564	A0WZ
Ethernet Expansion Card (CIOv) for BladeCenter	44W4475	5477
Intel 10Gb 2-port Ethernet Expansion Card (CFFh) for BladeCenter	42C1810	3593

HS23 (E5-2600) options that were tested for NEBS3 and ETSI compliance are shown in Table 5-4.

Table 5-4 HS23 (E5-2600) NEBS compliant options

Description	Part number	Feature code
Intel Xeon Processor E5-2648L 8C 1.8GHz 20MB Cache 1600MHz 70W	94Y8562	A240
Intel Xeon Processor E5-2658 8C 2.1GHz 20MB Cache 1600MHz 95W	94Y8565	A23Z
4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0563	A0WY
4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	90Y3147	A1S0
4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0564	A0WZ
4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	90Y3148	A1S1
8GB (1x8GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	00D4981	A3BT
8GB (1x8GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	00D4989	A3BV
8GB (1x8GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	00D4985	A3BU
8GB (1x8GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	00D4993	A3BW
16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0599	2422
16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	90Y3157	A3BS
32GB (1x32GB, 4Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	00D5008	A3KN
128GB SATA 2.5" MLC HS Enterprise Value SSD	90Y8648	A2U4
256GB SATA 2.5" MLC HS Enterprise Value SSD	90Y8643	A2U3
146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8926	A2XB
300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8877	A2XC
300GB 15K 6Gbps SAS 2.5" SFF HS HDD	81Y9670	A283
600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8872	A2XD
250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	81Y9722	A1NX
500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	81Y9726	A1NZ
10Gb Interposer Card for BladeCenter HS23	94Y8550	A244
Broadcom 10Gb Gen2 4-port Ethernet Exp Cd (CFFh) for BladeCenter	46M6164	0098
Broadcom 2-port 10Gb Virtual Fabric Adapter for BladeCenter	81Y3133	A1QR
Emulex 10GbE VFA II for BladeCenter HS23	81Y3120	A287
QLogic 8Gb Fibre Channel Expansion Card (CIOv) for BladeCenter	44X1945	1462
BladeCenter PCI Express Gen 2 Expansion Blade II	68Y7484	A247
Intel Ethernet Dual Port Server Adapter I340-T2 for System x	49Y4230	5767
Intel Ethernet Quad Port Server Adapter I340-T4 for System x	49Y4240	5768
Intel x520 Dual Port 10GbE SFP+ Adapter for System x	49Y7960	A2EC
Intel X540-T2 Dual Port 10GBaseT Adapter for System x	49Y7970	A2ED

HS23E options that were tested for NEBS3 and ETSI compliance are shown in Table 5-5.

Table 5-5 HS23E NEBS compliant

Description	Part number	Feature code
Intel Xeon Processor E5-2418L 4C 2.0GHz 10MB Cache 1333MHz 50W	94Y6288	A34M
Intel Xeon Processor E5-2428L 6C 1.8GHz 15MB Cache 1333MHz 60W	94Y6289	A34N
Intel Xeon Processor E5-2448L 8C 1.8GHz 20MB Cache 1600MHz 70W	94Y6290	A34P
4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0563	A0WY
4GB (1x4GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	90Y3147	A1S0
4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0564	A0WZ
4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	90Y3148	A1S1
8GB (1x8GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	00D4981	A3BT
8GB (1x8GB, 1Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	00D4989	A3BV
8GB (1x8GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	00D4985	A3BU
8GB (1x8GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	00D4993	A3BW
16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	46C0599	2422
16GB (1x16GB, 2Rx4, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	90Y3157	A3BS
146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8926	A2XB
300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8877	A2XC
300GB 15K 6Gbps SAS 2.5" SFF HS HDD	81Y9670	A283
600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	90Y8872	A2XD
900GB 10K 6Gbps SAS 2.5" SFF HS HDD	81Y9650	A282
250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	81Y9722	A1NX
500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	81Y9726	A1NZ
Broadcom 2-port 10Gb Virtual Fabric Adapter for BladeCenter	81Y3133	A1QR
QLogic 8Gb Fibre Channel Expansion Card (CIOv) for BladeCenter	44X1945	1462
ServeRAID H1135 Controller for Flex System and BladeCenter	90Y4750	A1XJ

Expansion card options that were tested for NEBS3 and ETSI compliance are shown in Table 5-6.

Table 5-6 Expansion card NEBS compliant options

Description	Part number	Feature code
10Gb Interposer Card for BladeCenter HS23	94Y8550	A244
Broadcom 10Gb Gen2 4-port Ethernet Exp Cd (CFFh) for BladeCenter	46M6164	0098
Broadcom 2-port 10Gb Virtual Fabric Adapter for BladeCenter	81Y3133	A1QR
Emulex 10GbE VFA II for BladeCenter HS23	81Y3120	A287
Ethernet Expansion Card (CIOv) for BladeCenter	44W4475	5477
QLogic 8Gb Fibre Channel Expansion Card (CIOv) for BladeCenter	44X1945	1462
BladeCenter PCI Express Gen 2 Expansion Blade II	68Y7484	A247
BladeCenter PCI Express I/O Expansion Unit	43W4391	4339
Intel Ethernet Dual Port Server Adapter I340-T2 for System x	49Y4230	5767
Intel Ethernet Quad Port Server Adapter I340-T4 for System x	49Y4240	5768
Intel X520 Dual Port 10GbE SFP+ Adapter for System x	49Y7960	A2EC
Intel X540-T2 Dual Port 10GBaseT Adapter for System x	49Y7970	A2ED
NetXtreme II 1000 Express Ethernet Adapter	39Y6066	1485

I/O module options that were tested for NEBS3 and ETSI compliance are shown in Table 5-7.

Table 5-7 I/O module NEBS compliant options

Description	Part number	Feature code
10Gb Ethernet Pass-Thru Module for BladeCenter	46M6181	1641
Brocade 20-port 8Gb SAN Switch Module for BladeCenter	44X1920	5481
Cisco Catalyst Switch Module 3012 for BladeCenter	46C9272	A3FE
Cisco Nexus 4001i Switch Module for BladeCenter	46C9270	A3FF
1/10Gb Uplink Ethernet Switch Module for BladeCenter	44W4404	1590
Layer 2/3 Copper Gb Ethernet Switch Module for BladeCenter	32R1860	1495
Virtual Fabric 10Gb Switch Module for BladeCenter	46C7191	1639
Intelligent Copper Pass-Thru Module for BladeCenter	44W4483	5452
QLogic 20-port 8Gb SAN Switch Module for BladeCenter	44X1905	5478
QLogic 8Gb Intelligent Pass-thru Module for BladeCenter	44X1907	5482
Server Connectivity Module for BladeCenter	39Y9324	1484

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this paper.

Lenovo Press publications

The following Lenovo Press publications provide additional information about the topic in this document. Note that some publications referenced in this list might be available in softcopy only.

- *BladeCenter Products and Technology*, SG24-7523
- *BladeCenter Virtual Fabric Solutions*, SG24-7966

Lenovo Press Product Guides are also available for the following BladeCenter components:

- Blade servers
- Switches and pass-through modules
- Adapters

You can find these publications at the following web page:

`http://lenovopress.com`

Other publications and online resources

These publications and websites are also relevant as further information sources:

- *Configuration and Option Guide*, found at:

  `https://support.lenovo.com/us/en/documents/SCOD-3ZVQ5W`
- BladeCenter Information Center:

  `http://publib.boulder.ibm.com/infocenter/bladectr/documentation`
- System Storage Interoperation Center:

  `http://www.ibm.com/systems/support/storage/ssic`
- ServerProven hardware compatibility page for BladeCenter:

  `http://www.lenovo.com/us/en/serverproven/eserver.shtml`
- *xREF: Lenovo System x Server Reference*:

  `http://lenovopress.com/xref`