

BladeCenter H

Product Guide (withdrawn product)

BladeCenter® remains an innovative solution to running business solutions. BladeCenter H efficiently integrates servers, storage, networking, I/O, and applications, which enables organizations to build flexible IT infrastructures by using common building blocks. In 9U of rack space, the BladeCenter H chassis can contain up to 14 blade servers, 10 switch modules, and four power supplies to provide the necessary I/O network switching, power, and cooling to support the individual servers.

Figure 1 shows the BladeCenter H chassis.



Figure 1. The BladeCenter H chassis

Did you know?

BladeCenter H delivers high performance, extreme reliability, and ultimate flexibility to even the most demanding IT environments.

The chassis supports up to four traditional fabrics by using networking switches, storage switches, or pass-through devices. The chassis also supports up to four high-speed fabrics for support of protocols such as 40 Gb InfiniBand or 10 Gb Ethernet. The built-in media tray includes light path diagnostics, two front USB inputs, and an optical drive.

Key features

This section lists the key features of the BladeCenter H chassis.

Scalability and performance

The BladeCenter H chassis offers numerous features to boost performance and improve scalability:

- Up to 14 servers with support for the latest generation of BladeCenter blades, helping provide performance and investment protection.
- Virtual Fabric offers up to 18 I/O ports on a single-wide blade and up to 10 I/O modules in a single chassis, with the choice of Ethernet, Fibre Channel, FCoE, InfiniBand, iSCSI, and SAS connectivity.
- BladeCenter H supports port speeds of up to 40 Gbps.
- BladeCenter H provides up to 1.92 Tbps of switching capacity with up to four Virtual Fabric 10 Gb switches.
- A flexible and scalable architecture with integrated servers and networking, storage, and management infrastructure supports your growing business needs.

Manageability and security

Powerful systems management features simplify local and remote management of the BladeCenter H chassis:

- The high degree of integration in the BladeCenter H chassis reduces the need for server components, replacing numerous fans, KVM and Ethernet cables, power supplies, external switches, and other components.
- The BladeCenter H chassis includes an Advanced Management Module (AMM). The AMM boosts administrator productivity and reduces skill level requirements, which can help reduce costs, improve overall productivity, and make administration easier, by providing a single point of control for the solution. The AMM supports many industry-standard and open protocols.
- The AMM provides extensive security features, including role-based user authentication and access control, LDAP support, and SSH and SSL protocols for secure remote systems management.
- IBM Systems Director remains a powerful and intelligent solution to manage BladeCenter systems along side rack mount and tower servers. Systems Director uses the hardware's capabilities by surfacing pertinent information about your blade server. The easy-to-use wizards provide step-by-step instructions and offer automated deployment capabilities.
- IBM Fabric Manager simplifies the deployment of infrastructure connections by managing network and storage address assignments.
- IBM FastSetup simplifies, automates, and speeds up the deployment process from server power-up to production, making BladeCenter easier to manage, deploy, and maintain.

Availability and serviceability

The BladeCenter H chassis provides many features to simplify serviceability and increase system uptime:

- BladeCenter reduces the number of parts that are required to run the system. Sharing fans, power supplies, systems management, and ports means that there are fewer parts to buy and maintain, and fewer components that can fail and cause downtime.
- Hot-swap components, such as the server, switches, power supplies, and blowers, ensure maximum uptime.
- Redundant components, such as blowers and power supplies, ensure that systems can remain available even during hardware maintenance windows and failures.
- The Predictive Failure Analysis (PFA) detects when system components operate outside of standard thresholds and generates proactive alerts in advance of possible failure, therefore increasing uptime.
- Dual independent power and signal connectors to the BladeCenter H chassis midplane provide fault tolerance to increase uptime.
- The light path diagnostics panel and individual light path LEDs quickly lead the technician to failed (or failing) components. These features simplify servicing, speed up problem resolution, and improves system

availability.

- A 3-year customer replaceable unit and onsite limited warranty and next business day 9x5 provides an additional peace of mind.

Energy efficiency

The BladeCenter H chassis offers the following energy-efficient features to save energy, reduce operational costs, increase energy availability, and contribute to a green environment:

- The energy-efficient components and component-sharing design of the BladeCenter chassis provides ultimate power and cooling savings.
- BladeCenter H helps reduce energy costs with leadership high-efficiency power supplies that are 94% efficient and 80 PLUS Platinum Certified.
- The BladeCenter H uses hexagonal ventilation holes, a part of Calibrated Vectors Cooling™ technology. Hexagonal holes can be grouped more densely than round holes, providing more efficient airflow through the system.
- IBM Systems Director Active Energy Manager™ provides advanced power management features with actual real-time energy monitoring, reporting, and capping features.

Locations of key components

Figure 2 shows the front of the BladeCenter H chassis.

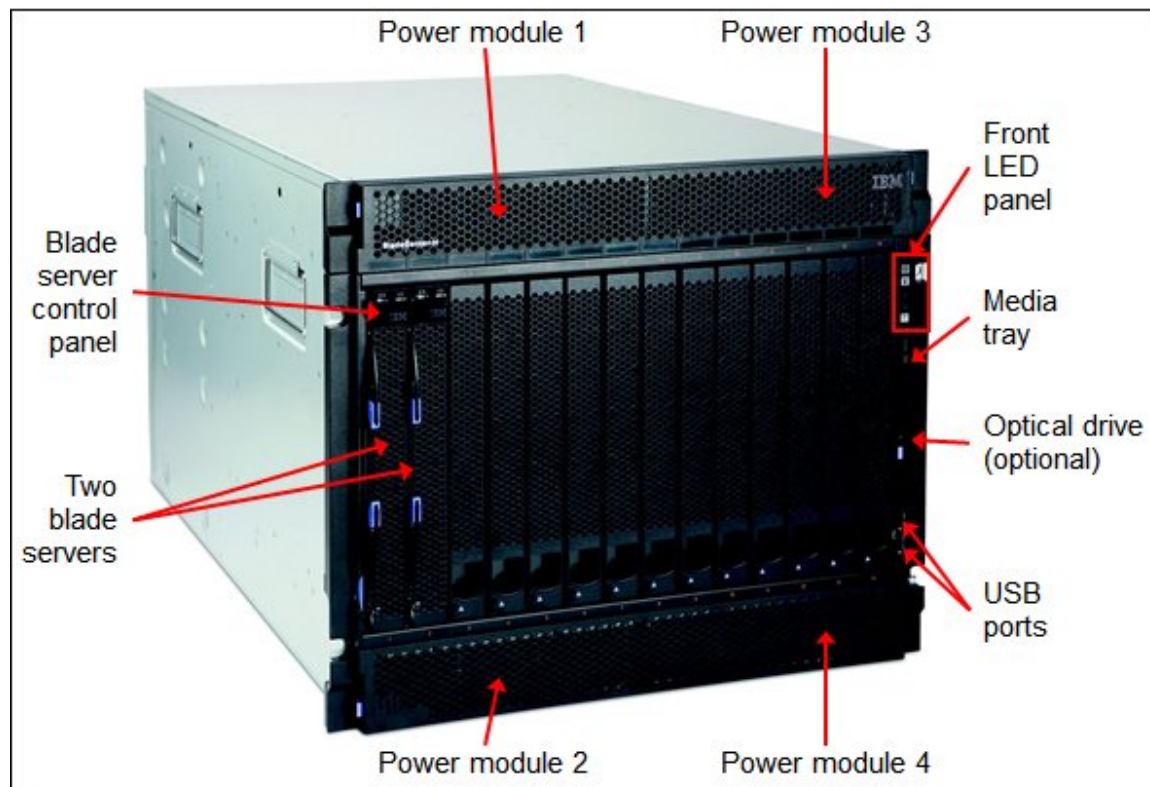


Figure 2. Front of the BladeCenter H chassis

Figure 3 shows the rear of the BladeCenter H chassis

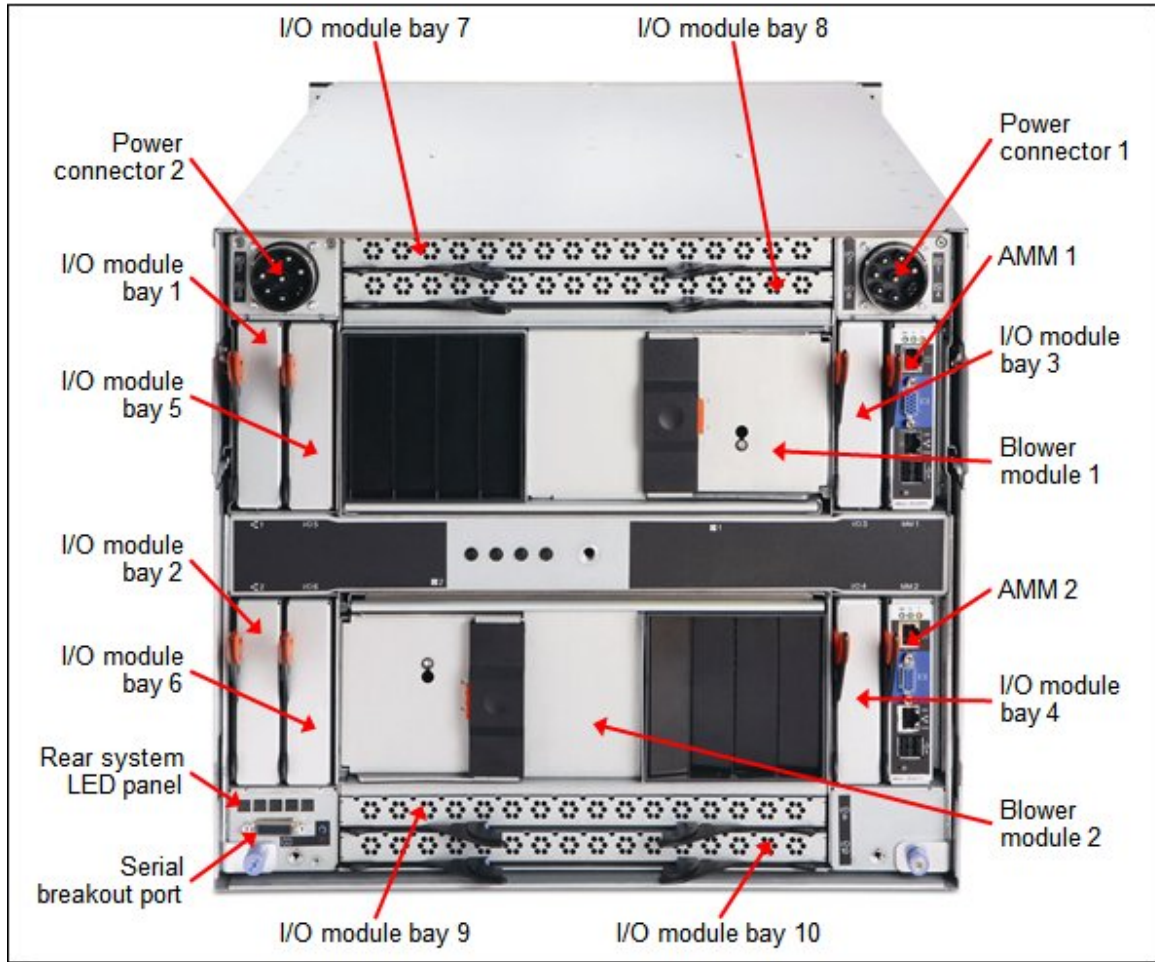


Figure 3. Rear of the BladeCenter H chassis

Standard specifications

Table 1 lists the standard specifications.

Table 1. Standard specifications

Components	Specification
Machine type	x-config: 8852, e-config: 7989.
Form factor	9U rack-mounted unit.
Server bays	14.
Servers supported	Intel Xeon processor-based HS12, HS22, HS22V, HS23, HS23E, and HX5 servers. IBM POWER® processor-based PS700, PS701, PS702, PS703, and PS704. Certain older BladeCenter servers.
Standard I/O bays	Six (Bays 1 - 6). Bays 1 - 4 support 1 Gb Ethernet, 4 Gb and 8 Gb Fibre Channel, and 3 Gb SAS I/O modules. Bays 3 - 6 support Ethernet-to-Fibre Channel bridge I/O modules.
High-speed I/O bays	Four (bays 7 - 10). Bays 7 - 10 support 10 Gb Ethernet, 10 Gb converged fabric, and 40 Gb InfiniBand I/O modules. With a Multi-switch Interconnect Module (MSIM), bays 7 - 10 support 1 Gb Ethernet and 4 Gb and 8 Gb Fibre Channel I/O modules.
Connectivity type	Ethernet, Fibre Channel, Fibre Channel over Ethernet (FCoE), InfiniBand, iSCSI, and SAS.
Management modules	Up to two redundant hot-swap Advanced Management Modules (AMM): One AMM is standard, and the second AMM is optional.
Optical drive bays	Media tray: One. There is support for an optional DVD-ROM or Multi-burner.
Ports	AMM: One DB-15 video port, two USB 2.0 ports for keyboard and mouse, one RJ-45 serial port, and one RJ-45 10/100 Mb Ethernet port for remote management. Media tray: Two USB 2.0 ports. Rear: One serial breakout port for optional serial breakout cable.
Cooling	Calibrated Vectored Cooling with two standard or enhanced redundant hot-swap blower modules (model dependent). You can have up to four fan packs with power modules (one fan pack per each power module).
Power modules	Up to four redundant hot-swap 2900 W (older models) or 2980 W power modules support two power domains; redundancy is provided within a pair in the same power domain. Power modules 1 and 2 supply power to server bays 1 - 7; power modules 3 and 4 supply power to server bays 8 - 14. (See the "Power modules" section for details.)
Hot-swap parts	Servers, I/O modules, management modules, media tray, power modules, and blowers.
Systems management	AMM, light path diagnostics, Predictive Failure Analysis, IBM Systems Director, and IBM Systems Director Active Energy Manager. Remote presence (graphics, keyboard and mouse, and virtual media) through AMM.
Security features	User-based security, user profiles, LDAP, SSH, and SSL.
Limited warranty	3-year customer-replaceable unit and onsite limited warranty with 9x5/next business day response time.
Service and support	Optional service upgrades are available through warranty upgrades: 9x5 or 24x7 4-hour or 2-hour response time, 1-year or 2-year warranty extension.
Dimensions	Height: 400 mm (15.8 in.), width: 483 mm (19.0 in.), depth: 711 mm (28.0 in.)
Weight	Minimum: 41 kg (90 lb), maximum 159 kg (350 lb)

Models

Table 2 lists the specifications of the standard BladeCenter H models.

Withdrawn: BladeCenter H is now withdrawn from marketing.

Table 2. BladeCenter H standard models

Feature	Specifications			
Machine type/model	8852-5Tx†	8852-94x†	8852-95x†	8852-96x†
Server bays (total / open)	14 / 14	14 / 14	14 / 14	14 / 14
Management modules (std. / max.)	1 / 2	2 / 2	2 / 2	2 / 2
Standard I/O bays (total / open)	6 / 6*	6 / 4*	6 / 4*	6 / 2*
High-speed I/O bays (total / open)	4 / 4	None	4 / 2	4 / 2
I/O modules standard	None	2x Server Connectivity Module 2x Brocade Converged 10GbE Switch Module	2x Server Connectivity Module 2x Cisco Nexus 40011 Switch Module	2x Server Connectivity Module 2x Virtual Fabric 10Gb Switch Module 2x QLogic Virtual Fabric Extension Module
SFP+ transceivers standard	None	4x Brocade 8Gb SFP+ SW Optical Transceiver 8x Brocade 10Gb SFP+ SR Optical Transceiver	8x Cisco 10GBASE-SR SFP+ Transceiver	8x 10GbE 850 nm Fiber SFP+ Transceiver (SR) 4x 8Gb SFP + SW Optical Transceiver
Software standard		1x BladeCenter Open Fabric Manager Basic	1x BladeCenter Open Fabric Manager Basic	1x BladeCenter Open Fabric Manager Basic
Power supplies (std. / max.)	2x 2980 W / 4	4x 2980 W / 4	4x 2980 W / 4	4x 2980 W / 4
Enhanced blowers (std. / max.)	2 / 2	2 / 2	2 / 2	2 / 2
Optical drive	Optional	Multi-burner	Multi-burner	Multi-burner

† x is a region-specific letter (for example, the EMEA MTM is 88524TG, and the US MTM is 88524TU).

* Two standard I/O bays (bays 3 and 4) can be used for either standard I/O modules or bridge I/O modules. For details, see the "I/O architecture" section.

Supported servers

Table 3 lists the blade servers that are supported in the BladeCenter H chassis. The table also lists the maximum number installable items based on thermal design power (TDP) of the Intel Xeon processor that is installed in the servers.

Table 3. Supported blade servers and maximum quantities

Blade server	CPU TDP	Maximum number of servers per BladeCenter H chassis			
		2900 W power supplies		2980 W power supplies	
		Standard blowers	Enhanced blowers	Standard blowers	Enhanced blowers
BladeCenter HS12 (8028)	All	14	14	14	14
BladeCenter HS22 (7870)	130 W	None	14	None	14
BladeCenter HS22V (7871)	95 W	6+6	14	14	14
	Up to 80 W	14	14	14	14
BladeCenter HS23 (7875, E5-2600 v2)	Up to 130 W (excl. 80 W)†	None	14*	None	14
	80 W†	14**	14	14**	14
	95 W#	14**§	14	14**§	14
	70 W#	14**	14	14**	14
	50 W#	14	14	14	14
BladeCenter HS23 (7875, E5-2600)	Up to 130 W (excl. 80 W)	None	14	None	14
	80 W	14	14	14	14
BladeCenter HS23E (8038)	Up to 95 W	14	14	14	14
BladeCenter HX5 (7872 and 7873) single-wide	130 W	None	10	None	12
	Up to 105 W	14	14	14	14
BladeCenter HX5 (7872 and 7873) + MAX5 double-wide	130 W	6	6	7	7
	Up to 105 W	7	7	7	7
BladeCenter PS700	All	14	14	14	14
BladeCenter PS701	All	14	14	14	14
BladeCenter PS702	All	7	7	7	7
BladeCenter PS703	All	14	14	14	14
BladeCenter PS704	All	7	7	7	7

† The support that is shown is for Intel Xeon standard thermal profile processors (all except Intel Xeon E5-2618L v2, E5-2628L v2, E5-2648L v2, and E5-2658 v2).

* Intel Xeon E5-2697 v2 and E5-2690 v2 processors throttle at Steady State at ambient temperature of 31 °C in the BladeCenter H chassis.

** 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 the BladeCenter H chassis with the standard blower modules.

§ 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 chassis with the standard blower modules.

The support that is shown is for Intel Xeon robust thermal profile processors: Intel Xeon E5-2618L v2 (50 W), E5-2628L v2 (70 W), E5-2648L v2 (70 W), and E5-2658 v2 (95 W).

For the latest information about the servers that are supported in the BladeCenter H chassis, see ServerProven® at <http://www.lenovo.com/us/en/serverproven/>

I/O architecture

The BladeCenter H chassis provides connection paths between the server blade bays and I/O bays through a hardwired dual redundant midplane.

The BladeCenter H chassis has two types of fabrics inside:

- Standard fabric (I/O bays 1, 2, 3, and 4)
- High-speed fabric (I/O bays 7, 8, 9, and 10)

The BladeCenter H chassis has a total of 10 I/O bays. Each blade bay has a total of eight dedicated connection paths to the I/O modules, as shown in the following figure.

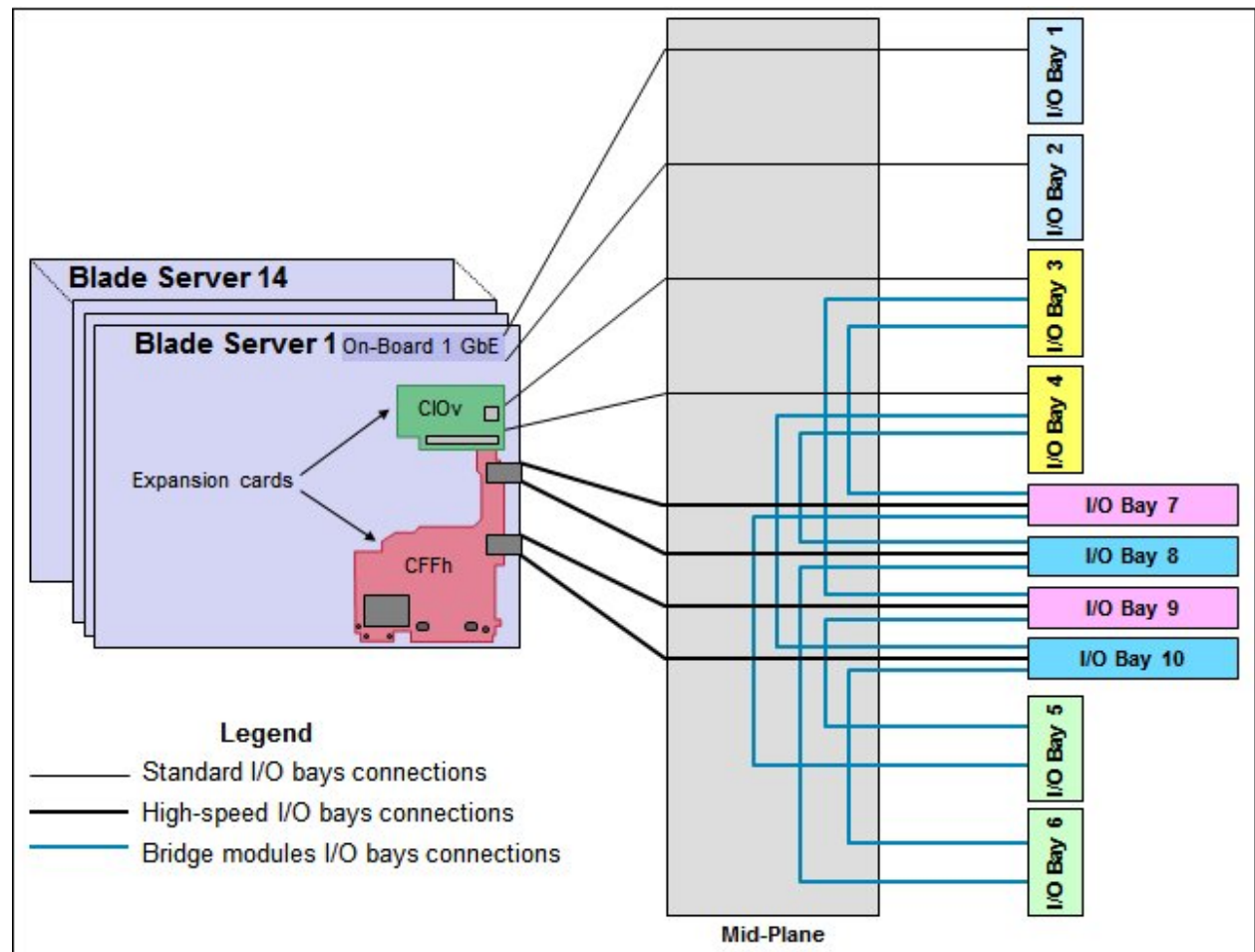


Figure 4. BladeCenter H I/O topology

The bays are:

- Bays 1 and 2 support only standard Ethernet-compatible I/O modules. These bays are routed internally to the onboard Ethernet controllers on the blades.
- Bays 3 and 4 can be used either for standard switch or pass-through modules (such as 8 Gb Fibre Channel or Gigabit Ethernet modules) or for bridge modules. These bays are routed internally to the CIOv connector on the blades.
- Bays 5 and 6 are dedicated for bridge modules only and do not directly connect to the blade bays. Bridge modules provide links to the I/O bays 7 - 10 and can be used as additional outputs for I/O modules in those bays. If I/O bays 3 and 4 are used for bridge modules, they are not directly connected to the blades, and bay 3 provides redundancy for bay 5, and bay 4 provides redundancy for bay 6.
- I/O bays 7 - 10 are used for high-speed switch modules such as the Virtual Fabric 10 Gb Switch Module or

Cisco Nexus 4001I Switch Module. These bays are routed internally through midplane connectors to the ports on CFFh expansion cards (with HS23 blade, I/O bays 7 and 9 are routed to the integrated 10GbE ports on HS23 through LOM Interposer Card). I/O bays 7 - 10 can also be converted to the standard I/O bays with the Multi-Switch Interconnect Module (MSIM).

The I/O modules must be compatible with the I/O interfaces that are present in the blade servers. For example, when a Fibre Channel expansion card is installed in a blade server, I/O modules 3 and 4 must also be Fibre Channel-based (that is, an FC switch module), and vice versa. If you install FC switches in bays 3 and 4, then any expansion cards that are installed in all other blade servers in the same chassis must be Fibre Channel.

Table 4 shows the connections between the adapter slots in the compute nodes to the switch bays in the chassis.

Table 4. Adapter to I/O bay correspondence

I/O adapter in each server	Port on the adapter	Corresponding I/O module bay in the chassis
Onboard 1 Gb Ethernet	Port 1	I/O bay 1
	Port 2	I/O bay 2
Onboard 10 Gb Ethernet (HS23)	Port 1	I/O bay 7
	Port 2	I/O bay 9
CIOv adapter	Port 1	I/O bay 3
	Port 2	I/O bay 4
CFFh adapter	Port 1	I/O bay 7
	Port 2	I/O bay 9
	Port 3	I/O bay 8
	Port 4	I/O bay 10

Supported I/O modules

Tables 5 through 7 list the I/O modules that are supported by the BladeCenter H chassis and the corresponding I/O bay into which the I/O module can be installed.

Table 5. Supported Ethernet I/O modules

I/O module	Part number	Feature code (x-config / e- config)	I/O bay number									
			1	2	3	4	5	6	7	8	9	10
Gigabit Ethernet												
Cisco Catalyst Switch Module 3012	43W4395 #	5450 / 3174	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
Cisco Catalyst Switch Module 3012	46C9272 #	A3FE / 3174	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
Cisco Catalyst Switch Module 3110G	41Y8523 #	2989 / 3173	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
Cisco Catalyst Switch Module 3110G	00Y3254 #	A3FD / 3173	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
Cisco Catalyst Switch Module 3110X	41Y8522 #	2988 / 3171	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
Cisco Catalyst Switch Module 3110X	00Y3250 #	A3FC / 3171	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
1/10Gb Uplink Ethernet Switch Module	44W4404	1590 / 1590	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
L2/3 Copper GbE Switch Module	32R1860	1495 / 3212	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
L2/3 Fiber GbE Switch Module	32R1861	1496 / 3213	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
L2-7 Gb Ethernet Switch Module	32R1859 #	1494 / 3211	Y	Y	Y	Y	N	N	N	N	N	N
Server Connectivity Module	39Y9324	1484 / 3220	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
10 Gb Ethernet												
Brocade Converged 10GbE Switch Module	69Y1909 #	7656 / none	N	N	N	N	N	N	Y†		Y†	
Cisco Nexus 4001I Switch Module	46M6071 #	0072 / 2241	N	N	N	N	N	N	Y	Y	Y	Y
Cisco Nexus 4001I Switch Module	46C9270 #	A3FF / 2241	N	N	N	N	N	N	Y	Y	Y	Y
Virtual Fabric 10Gb Switch Module	46C7191	1639 / 3248	N	N	N	N	N	N	Y	Y	Y	Y

Withdrawn, not available for ordering.

* Requires MSIM (39Y9314, feature code 1465) to be installed in high-speed I/O bays 7 and 8 or 9 and 10 or both when the module is used in bays 7 - 10.

† The Brocade Converged 10GbE Switch Module occupies two adjacent high-speed bays.

Table 6. Supported Fibre Channel I/O modules

I/O module	Part number	Feature code (x-config / e- config)	I/O bay number										
			1	2	3	4	5	6	7	8	9	10	
4 Gb Fibre Channel													
Cisco 4Gb 20 port FC Switch Module	39Y9280 #	2983 / 3242	N	N	Y	Y	N	N	N	N	Y*	N	Y*
Cisco 4Gb 20 port FC Switch Module	44E5696 #	A3FH / 3242	N	N	Y	Y	N	N	N	N	Y*	N	Y*
Cisco 4Gb 10 port FC Switch Module	39Y9284 #	2984 / 3241	N	N	Y	Y	N	N	N	N	Y*	N	Y*
Cisco 4Gb 10 port FC Switch Module	44E5692 #	A3FG / 3241	N	N	Y	Y	N	N	N	N	Y*	N	Y*
8 Gb Fibre Channel													
Brocade Enterprise 20-port 8Gb SAN Switch Module	42C1828	5764 / none	N	N	Y	Y	N	N	N	N	Y*	N	Y*
Brocade 20-port 8Gb SAN Switch Module	44X1920	5481 / 5869	N	N	Y	Y	N	N	N	N	Y*	N	Y*
Brocade 10-port 8Gb SAN Switch Module	44X1921	5483 / 5045	N	N	Y	Y	N	N	N	N	Y*	N	Y*
QLogic 20-Port 8Gb SAN Switch Module	44X1905 #	5478 / 3284	N	N	Y	Y	N	N	N	N	Y*	N	Y*
QLogic 20-Port 4/8Gb SAN Switch Module	88Y6406 #	A24C / none	N	N	Y	Y	N	N	N	N	Y*	N	Y*
QLogic 8Gb Intelligent Pass-thru Module	44X1907	5482 / 5449	N	N	Y	Y	N	N	N	N	Y*	N	Y*
QLogic 4/8Gb Intelligent Pass-thru Module	88Y6410 #	A24D / none	N	N	Y	Y	N	N	N	N	Y*	N	Y*
QLogic Virtual Fabric Extension Module	46M6172 #	4799 / none	N	N	Y	N	Y	N	N	N	N	N	N

Withdrawn, not available for ordering.

* Requires MSIM (39Y9314, feature code 1465) or MSIM-HT (44R5913, feature code 5491) to be installed in high-speed I/O bays 7 and 8 or 9 and 10 or both when the module is used in bay 8 or 10 or both.

Table 7. Supported SAS, InfiniBand, Pass-thru, and interconnect I/O modules

I/O module	Part number	Feature code (x-config / e- config)	I/O bay number										
			1	2	3	4	5	6	7	8	9	10	
SAS modules													
SAS Connectivity Module	39Y9195	2980 / 3267	N	N	Y	Y	N	N	N	N	N	N	N
InfiniBand modules													
Voltaire 40Gb InfiniBand Switch Module	46M6005 #	0057 / 3204	N	N	N	N	N	N	N	Y†	Y†	Y†	Y†
Pass-through and interconnect modules													
Intelligent Copper Pass-thru Module	44W4483	5452 / 5452	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*	Y*
10Gb Ethernet Pass-thru Module	46M6181	1641 / 5412	N	N	N	N	N	N	Y	Y	Y	Y	Y
Multi-Switch Interconnect Module	39Y9314	1465 / 3239	N	N	N	N	N	N	Y†	Y†	Y†	Y†	Y†

Withdrawn from marketing

† This module occupies two adjacent high-speed bays.

* Requires MSIM (39Y9314, feature code 1465) to be installed in high-speed I/O bays 7 and 8 or 9 and 10 or both when the module is used in bays 7 - 10.

For more information, see the following Lenovo Press Product Guides:

- Ethernet switches
<https://lenovopress.com/servers/blades/networkmodule>
- Fibre Channel switches
<https://lenovopress.com/servers/blades/storagemodule>

Optical drives

The BladeCenter H supports one optical drive in the optical drive bay on the media tray. The optical drive and USB ports are available to any one blade server in the chassis. The drive and USB ports cannot be shared among multiple servers. The drive and USB ports can be used to install operating systems, update drivers, or to copy data to recordable media.

Table 8 lists the supported optical drives.

Table 8. Supported optical drives

Part number	Feature code	Description	Maximum supported	Standard models where used
46M0901	4161	UltraSlim Enhanced SATA DVD-ROM	1	-
46M0902	4163	UltraSlim Enhanced SATA Multi-Burner	1	94x, 95x, 96x

UltraSlim Enhanced SATA DVD-ROM (part number 46M0901) supports the following media and speeds for reading:

- CD-ROM 24X
- CD-R 24X
- CD-RW 24X
- DVD-ROM (4.7 GB) 8X
- DVD-ROM (dual layer, 8.5 GB) 8X
- DVD-R (4.7 GB) 8X
- DVD-R (dual layer, 8.5 GB) 8X
- DVD+R (4.7 GB) 8X
- DVD+R (dual layer, 8.5 GB) 8X
- DVD-RW (4.7 GB) 8X
- DVD+RW (4.7 GB) 8X
- DVD-RAM (4.7 GB) 5X

IBM UltraSlim Enhanced SATA Multi-Burner (46M0902) supports the same media and speeds for reading as DVD-ROM (46M0901). This drive also supports the following media and speeds for writing:

- CD-R 24X
- CD-RW 4X
- High Speed CD-RW 10X
- Ultra Speed CD-RW 24X
- Ultra Speed Plus CD-RW 24X
- DVD-R (4.7 GB) 8X
- DVD-R (dual layer, 8.5 GB) 6X
- DVD+R (4.7 GB) 8X
- DVD+R (dual layer, 8.5 GB) 6X
- DVD-RW (4.7 GB) 6X
- DVD+RW (4.7 GB) 8X
- DVD-RAM (4.7 GB) 5X

Remote management

Remote management functionality is provided by the Advanced Management Module (AMM). The AMM is a hot-swap module that you use to configure and manage all installed BladeCenter components. The AMM provides system management functions and KVM multiplexing for all blade servers in the BladeCenter unit that support KVM. It controls a serial port for remote connection, the external keyboard, mouse, and video connections for use by a local console, and a 10/100 Mbps Ethernet remote management connection.

The BladeCenter H chassis comes standard with at least one AMM, and it supports up to two redundant hot-swap AMMs in an active/standby configuration. Table 9 shows the AMM ordering information.

Table 9. Advanced Management Module

Part number	Feature code	Description
2019A1X	1604	Advanced Management Module for BladeCenter

Figure 5 shows the Advanced Management Module.

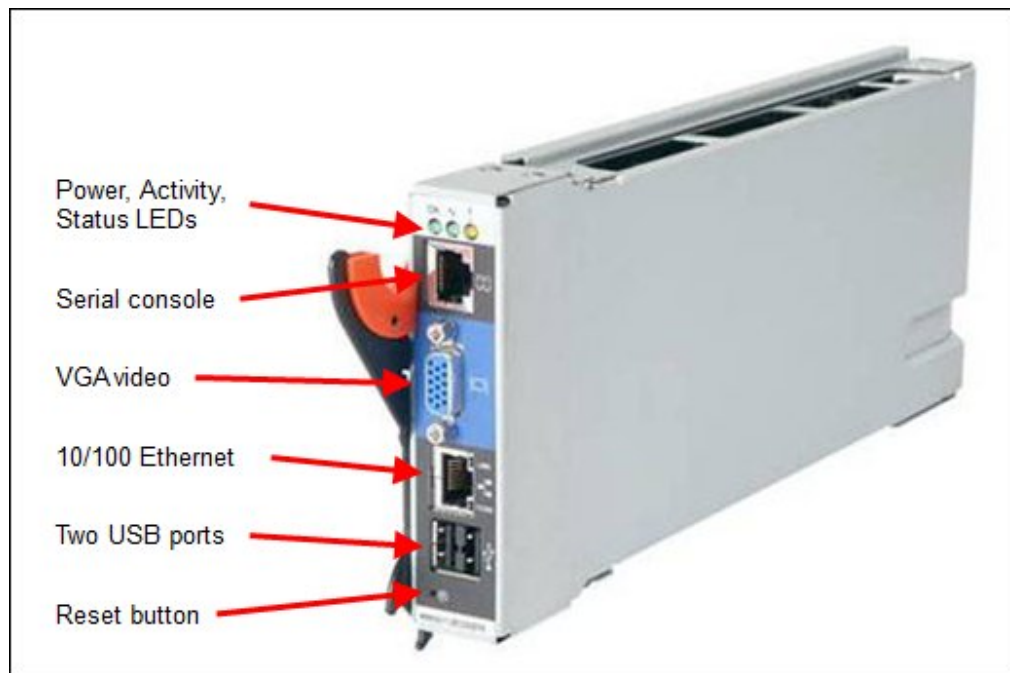


Figure 5. Advanced Management Module

The following tasks can be performed with AMM:

- Defining the login IDs and passwords
- Configuring security settings, such as data encryption and user account security
- Selecting recipients for alert notification of specific events
- Monitoring the status of the BladeCenter unit, blade servers, and other BladeCenter components:
 - Event log
 - LEDs
 - Hardware and firmware VPD
 - Fan speeds
 - Temperatures
 - Power usage
- Discovering other BladeCenter units in the network and enabling access to them through their management-module web interfaces
- Controlling the BladeCenter unit, blade servers, and other BladeCenter components:

- Power on/off
 - Firmware update
 - Configuration settings
 - Serial over LAN
- Configuring power management for the BladeCenter unit
 - Accessing the I/O modules to configure them
 - Changing the startup sequence in a blade server
 - Setting the date and time
 - Using a remote console for the blade servers
 - Mounting remote virtual media for the blade servers
 - Changing ownership of the keyboard, video, and mouse
 - Changing ownership of the removable-media drives and USB ports (The removable-media drives in the BladeCenter unit are viewed as USB devices by the blade server operating system.)
 - Using IBM Fabric Manager functions
 - Using Service Advisor functions to autonomously inform Lenovo Support about any critical events that happen

AMM supports the following management methods:

- Web-based interface with SSL support
- CLI through Telnet/SSH
- SMASH Command Line Protocol
- SNMP

For more information about AMM, see the following product documentation:

- *BladeCenter Advanced Management Module Installation Guide* , found at: <http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5073392>
- *BladeCenter Advanced Management Module User's Guide* , found at: <http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5073887>
- *Advanced Management Module Command Line Interface Reference Guide* , found at: <http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-54667>

Serial console

The BladeCenter H has a serial port breakout connector to provide a direct serial connection to installed blades (for those blades with the functionality) with the Serial Port Breakout Cable. This cable connects directly to the port on the rear of the BladeCenter H, providing 14 serial connections for terminal access, one to each supported blade server.

Important: HS23, HS23E, HX5, PS700, PS701, PS702, PS703, and PS704 blades do not support direct serial connections.

Table 10 contain the ordering information for the Serial Port Breakout Cable.

Table 10. Serial Port Breakout Cable ordering part number and feature code

Part number	Feature code	Description
40K9605	4811	Serial Port Breakout Cable for BladeCenter

Power modules

The BladeCenter H supports up to four hot-swap redundant 2980 W AC power modules. Power module redundancy is provided within a pair (power modules 1 and 2; power modules 3 and 4). Older models might contain 2900 W power modules. To determine whether you need 2980 W power supplies, consult the "Supported servers" section.

The power modules in bays 1 and 2 are used to power blade servers in blade bays 1 - 7 and I/O modules in I/O module bays 1 - 4 and 7 - 10. The power modules are needed in power module bays 3 and 4 if you install blade servers in blade bays 8 - 14, or if you install I/O modules in any of I/O module bays 5 - 10.

Two power modules are standard in model 5Tx, and a maximum of four power modules are supported. Models 93x, 94x, and 95x come standard with four power supplies. Table 11 shows the ordering information for power modules (the part number contains two power modules).

Table 11. Power modules ordering part number and feature code

Part number	Feature code	Description
68Y6601	2143	BladeCenter H 2980 W AC Power Modules (2) with Fan Packs

No power cables are shipped with either the BladeCenter H chassis or the power module option. Order them separately (two power cables per one chassis). Table 12 contains the ordering information for power cables.

Table 12. Power cable ordering part numbers and feature codes

Part number	Feature code	Description
25R5783	6270	4.3 m 208 V Double 30A NEMA L6-30P
25R5784	6271	4.3 m 230 V Dual 32A IEC 309 P+N+G/16A IEC 320-C20
25R5785	6226	2.8 m 200-240 V Triple 16A IEC 320-C20
25R5811	6273	4.3 m 220 V Double 30A KSC 8305 (for South Korea)
25R5812	6272	4.3 m 230 V Dual 32A AS/NZS 3112/16A IEC 320-C20 (for Australia/NZ)

Cooling modules

The BladeCenter H comes with two hot-swap blowers for cooling redundancy. There are two types of blower modules that are available:

- Standard blowers: Standard in model 8852-4Sx and older models.
- Enhanced Cooling Module (also referred to as the *enhanced blower*): Standard in models 5Tx, 94x, 95x, 96x, and some older models (4Tx, 91x, 92x, 93x). Optional in other older BladeCenter H models.

To determine whether you need Enhanced Cooling modules, consult the "Supported servers" section.

Table 13 lists the optional enhanced blowers that can be ordered for the BladeCenter H chassis (the part number contains two blowers).

Table 13. Enhanced cooling modules ordering part number and feature code

Part number	Feature code	Description
68Y6650	0724	BladeCenter H Enhanced Cooling Modules (two blowers)

Physical and electrical specifications

Dimensions and weight (approximate):

- Height: 400 mm (15.8 in.)
- Width: 483 mm (19.0 in)
- Depth: 711 mm (28.0 in)
- Weight:
 - Minimum configuration: 41 kg (90 lb)
 - Maximum configuration: 159 kg (350 lb)

Supported environment:

- Temperature and humidity:
 - 10.0 - 35.0 degrees C (50 - 95 degrees F) at 0 - 914 m (0 - 3,000 ft)
 - 10.0 - 32.0 degrees C (50 - 90 degrees F) at 914 - 2,133 m (3,000 - 7,000 ft)
 - Relative humidity: 8% - 80%
 - Maximum altitude: 2,133 m (7,000 ft)
- Supported electrical input:
 - 200 - 240 (nominal) V ac; 50 Hz or 60 Hz; 37 A (X2)/48 A maximum
- Input kilovolt-amperes (kVA) (approximately):
 - Minimum configuration: 0.3 kVA
 - Maximum configuration: 9.6 kVA
- BTU output:
 - Minimum configuration: 1024 Btu/hr (300 VA)
 - Maximum configuration: 32409 Btu/hr (9600 VA)
- Acoustical:
 - Declared sound power level: 7.5 bels

Warranty options

The system has a three-year warranty with 24x7 standard call center support and 9x5 Next Business Day onsite coverage. Also available are Lenovo Services warranty maintenance upgrades and post-warranty maintenance agreements, with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo warranty service upgrade offerings are region-specific. Not all warranty service upgrades are available in every region. For more information about Lenovo warranty service upgrade offerings that are available in your region, go to the Data Center Advisor and Configurator website <http://dcsc.lenovo.com>, then do the following:

1. In the Customize a Model box in the middle of the page, select the **Services** option in the Customization Option dropdown menu
2. Enter in the machine type & model of the system
3. From the search results, you can click either **Deployment Services** or **Support Services** to view the offerings

The following table explains warranty service definitions in more detail.

Table 14. Warranty service definitions

Term	Description
On-site service	A service technician will arrive at the client's location for equipment service.
24x7x2 hour	A service technician is scheduled to arrive at the client's location within two hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
24x7x4 hour	A service technician is scheduled to arrive at the client's location within four hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
9x5x4 hour	A service technician is scheduled to arrive at the client's location within four business hours after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday-Friday, excluding Lenovo holidays. For example, if a customer reports an incident at 3:00 pm on Friday, the technician will arrive by 10:00 am the following Monday.
9x5 next business day	A service technician is scheduled to arrive at the client's location on the business day after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday - Friday, excluding Lenovo holidays. Calls received after 4:00 pm local time require an extra business day for service dispatch. Next business day service is not guaranteed.
Committed Repair	Problems receive priority handling so that repairs are completed within the committed time of 6, 8, or 24 hours. Lenovo provides service 24 hours/day, every day, including Lenovo holidays.

The following Lenovo warranty service upgrades are available:

- Warranty and maintenance service upgrades:
 - Three, four, or five years of 9x5 or 24x7 service coverage
 - Onsite response from next business day to 2 or 4 hours
 - Committed repair service
 - Warranty extension of up to 5 years
 - Post warranty extensions
- Committed Repair Service
 Committed Repair Services enhances the level of Warranty Service Upgrade or Post Warranty/Maintenance Service offering associated with the selected systems. Offerings vary and are available in select countries.
 - Priority handling to meet defined time frames to restore the failing machine to good working condition
 - Committed repair service levels are measured within the following coverage hours:
 - 24x7x6: Service performed 24 hours per day, 7 days per week, within 6 hours
 - 24x7x8: Service performed 24 hours per day, 7 days per week, within 8 hours
 - 24x7x24: Service performed 24 hours per day, 7 days per week, within 24 hours
- Hard Disk Drive Retention
 Lenovo's Hard Disk Drive Retention (HDDR) service is a multi-drive hard drive retention offering that ensures your data is always under your control, regardless of the number of hard drives that are installed in your Lenovo server. In the unlikely event of a hard drive failure, you retain possession of your hard drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The Hard Drive Retention service can be purchased in convenient bundles with our warranty upgrades and extensions.
- Microcode Support
 Keeping microcode current helps prevent hardware failures and security exposure. There are two levels of service: analysis of the installed base and analysis and update where required. Offerings vary by region and can be bundled with other warranty upgrades and extensions.

- Remote Technical Support Services (RTS)
RTS provides comprehensive technical call center support for covered servers, storage, operating systems, and applications. Providing a single source for support of hardware and software issues, RTS can reduce problem resolution time, decreasing the cost to address technical problems and increasing uptime. Offerings are available for Windows, Linux, IBM Systems Director, VMware, Microsoft business applications, and Lenovo System x storage devices, and IBM OEM storage devices.

Regulatory compliance

The chassis conforms to the following regulations:

- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, Class A
- UL/IEC 60950-1(11)
- CAN C22.2 No. 60950-1-03
- NOM-019(11)
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2008, Class A
- IEC-60950-1 (CB Certificate and CB Test Report)
- Russia/GOST ME01, IEC-60950-1
- CE Mark (EN55022 Class A, EN60950, and EN55024)
- CISPR 22, Class A
- TUV-GS (EN60950-1, EK1-ITB)

External disk storage systems

Table 15 lists the external storage systems that are supported by the blade servers that are installed in the BladeCenter H chassis and can be ordered through the System x® sales channel. The servers might support other disk systems that are not listed in this table. For more information, see the IBM System Storage® Interoperation Center at <http://www.ibm.com/systems/support/storage/ssic>.

Table 15. External disk storage systems

Part number	Description
IBM Storwize® V3700	
20722LC	IBM Storwize V3700 LFF Dual Control Enclosure
20722SC	IBM Storwize V3700 SFF Dual Control Enclosure
IBM System Storage DS3500	
1746A2D	IBM System Storage DS3512 Express Dual Controller Storage System
1746A2S	IBM System Storage DS3512 Express Single Controller Storage System
1746A4D	IBM System Storage DS3524 Express Dual Controller Storage System
1746A4S	IBM System Storage DS3524 Express Single Controller Storage System
IBM System Storage DS3950 (5020)	
181494H	IBM System Storage DS3950 Model 94
181498H	IBM System Storage DS3950 Model 98

For more information, see the list of Lenovo Press Product Guides in the IBM Storage category at <https://lenovopress.com/storage/san/ibm>

External backup units

The blade servers that are installed in the BladeCenter H chassis support the external backup attachment options that are listed in the following table.

Table 16. External backup options

Part number	Description
External tape expansion enclosures for internal tape drives	
87651UX	1U Tape Drive Enclosure
8767HHX	Half High Tape Drive Enclosure
87651NX	1U Tape Drive Enclosure (with NEMA 5-15P Line Cord)
8767HNX	Half High Tape Drive Enclosure (with NEMA 5-15P Line Cord)
Tape enclosure adapters (with cables)	
44E8869	USB Enclosure Adapter Kit
40K2599	SAS Enclosure Adapter Kit
Internal backup drives that are supported by external tape enclosures	
46C5399	DDS Generation 5 USB Tape Drive
39M5636	DDS Generation 6 USB Tape Drive
43W8478	Half High LTO Gen 3 SAS Tape Drive
44E8895	Half High LTO Gen 4 SAS Tape Drive
49Y9898	Half High LTO Gen 5 Internal SAS Tape Drive
External backup units*	
3628L3X	Half High LTO Gen 3 External SAS Tape Drive (with US power cord)
3628L4X	Half High LTO Gen 4 External SAS Tape Drive (with US power cord)
3628L5X	Half High LTO Gen 5 External SAS Tape Drive (with US power cord)
3628N3X	Half High LTO Gen 3 External SAS Tape Drive (without power cord)
3628N4X	Half High LTO Gen 4 External SAS Tape Drive (without power cord)
3628N5X	Half High LTO Gen 5 External SAS Tape Drive (without power cord)
3580S3V	System Storage TS2230 Tape Drive Express Model H3V
3580S4V	System Storage TS2240 Tape Drive Express Model H4V
3580S5E	System Storage TS2250 Tape Drive Express Model H5S
3580S5X	System Storage TS2350 Tape Drive Express Model S53
3572S4R	TS2900 Tape Library with LTO4 HH SAS drive & rack mount kit
3572S5R	TS2900 Tape Library with LTO5 HH SAS drive & rack mount kit
35732UL	TS3100 Tape Library Model L2U Driveless
35734UL	TS3200 Tape Library Model L4U Driveless
46X2682†	LTO Ultrium 5 Fibre Channel Drive
46X2683†	LTO Ultrium 5 SAS Drive Sled
46X2684†	LTO Ultrium 5 Half High Fibre Drive Sled
46X2685†	LTO Ultrium 5 Half High SAS Drive Sled
46X6912†	LTO Ultrium 4 Half High Fibre Channel Drive Sled
46X7117†	LTO Ultrium 4 Half High SAS DriveV2 Sled
46X7122†	LTO Ultrium 3 Half High SAS DriveV2 Sled

* Note: The external tape drives listed can be ordered through the System x sales channel. The server might support other tape drives that are not listed in this table. For more information, see the IBM System Storage Interoperability Center.

† Note: These part numbers are the tape drives options for 35732UL and 35734UL.

For more information, see the list of Lenovo Press Product Guides in the Backup units category at <https://lenovopress.com/storage/tape/drives>

Top-of-rack Ethernet switches

The following table lists the Ethernet LAN switches that are offered by Lenovo.

Table 17. Ethernet LAN switches

Part number	Description
1 Gb Ethernet Rack switches	
7Y810011WW	Lenovo ThinkSystem NE0152T RackSwitch (Rear to Front)
7Z320011WW	Lenovo ThinkSystem NE0152TO RackSwitch (Rear to Front, ONIE)
7159BAX	Lenovo RackSwitch G7028 (Rear to Front)
7159CAX	Lenovo RackSwitch G7052 (Rear to Front)
7159G52	Lenovo RackSwitch G8052 (Rear to Front)
7165H1X	Juniper EX2300-C PoE Switch
7165H2X	Juniper EX2300-24p PoE Switch
1 Gb Ethernet Campus switches	
7Z340011WW	Lenovo CE0128TB Switch (3-Year Warranty)
7Z360011WW	Lenovo CE0128TB Switch (Limited Lifetime Warranty)
7Z340012WW	Lenovo CE0128PB Switch (3-Year Warranty)
7Z360012WW	Lenovo CE0128PB Switch (Limited Lifetime Warranty)
7Z350021WW	Lenovo CE0152TB Switch (3-Year Warranty)
7Z370021WW	Lenovo CE0152TB Switch (Limited Lifetime Warranty)
7Z350022WW	Lenovo CE0152PB Switch (3-Year Warranty)
7Z370022WW	Lenovo CE0152PB Switch (Limited Lifetime Warranty)
10 Gb Ethernet switches	
7159A1X	Lenovo ThinkSystem NE1032 RackSwitch (Rear to Front)
7159B1X	Lenovo ThinkSystem NE1032T RackSwitch (Rear to Front)
7Z330011WW	Lenovo ThinkSystem NE1064TO RackSwitch (Rear to Front, ONIE)
7159C1X	Lenovo ThinkSystem NE1072T RackSwitch (Rear to Front)
7159CRW	Lenovo RackSwitch G8272 (Rear to Front)
7159GR6	Lenovo RackSwitch G8296 (Rear to Front)
7159BR6	Lenovo RackSwitch G8124E (Rear to Front)
25 Gb Ethernet switches	
7159E1X	Lenovo ThinkSystem NE2572 RackSwitch (Rear to Front)
7Z210021WW	Lenovo ThinkSystem NE2572O RackSwitch (Rear to Front, ONIE)
7Z330021WW	Lenovo ThinkSystem NE2580O RackSwitch (Rear to Front, ONIE)
100 Gb Ethernet switches	
7159D1X	Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front)
7Z210011WW	Lenovo ThinkSystem NE10032O RackSwitch (Rear to Front, ONIE)

For more information, see the list of Product Guides in the following switch categories:

- 1 Gb Ethernet switches: <http://lenovopress.com/networking/tor/1gb?rt=product-guide>
- 10 Gb Ethernet switches: <http://lenovopress.com/networking/tor/10gb?rt=product-guide>
- 25 Gb Ethernet switches: <http://lenovopress.com/networking/tor/25gb?rt=product-guide>
- 40 Gb Ethernet switches: <http://lenovopress.com/networking/tor/40gb?rt=product-guide>
- 100 Gb Ethernet switches: <https://lenovopress.com/networking/tor/100Gb?rt=product-guide>

Fibre Channel SAN switches

Lenovo offers the ThinkSystem DB Series of Fibre Channel SAN switches for high-performance storage expansion. See the DB Series product guides for models and configuration options:

- ThinkSystem DB Series SAN Switches:
<https://lenovopress.com/storage/switches/rack#rt=product-guide>

Power distribution units

Power planning for an BladeCenter H is strongly recommended. For details about possible power configurations, see the BladeCenter Power Guide, found at <http://ibm.com/support/entry/portal/docdisplay?Indocid=LNVO-POWINF>

The chassis supports attachments to the power distribution units (PDUs) that are listed in the following table.

Table 18. Power distribution units

Part number	Description
Switched and monitored PDUs	
46M4002	1U 9 C19/3 C13 Active Energy Manager DPI PDU
46M4003	1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU
46M4167	1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU
46M4134	0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU
46M4140	0U 12 C19/12 C13 50A 3 Phase PDU
Enterprise PDUs	
71762MX	Ultra Density Enterprise PDU C19 PDU+ (WW)
71762NX	Ultra Density Enterprise PDU C19 PDU (WW)
71763MU	Ultra Density Enterprise PDU C19 3 phase 60A PDU+ (NA)
71763NU	Ultra Density Enterprise PDU C19 3 phase 60A PDU (NA)
39Y8923	DPI 60A Three Phase C19 Enterprise PDU with IEC309 3P+G (208 V) fixed power cord
39Y8948	DPI Single Phase C19 Enterprise PDU without power cord
Front-end PDUs	
39Y8934	DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd connector
39Y8938	30amp/125V Front-end PDU with NEMA L5-30P connector
39Y8939	30amp/250V Front-end PDU with NEMA L6-30P connector
39Y8940	60amp/250V Front-end PDU with IEC 309 60A 2P+N+Gnd connector
0U Basic PDUs	
46M4140	0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	0U 12 C19/12 C13 32A 3 Phase PDU

For more information, see the list of Lenovo Press Product Guides in the PDU category at:
<https://lenovopress.com/servers/options/pdu>

Uninterruptible power supply units

The BladeCenter H chassis supports attachments to the uninterruptible power supply units listed in the following table.

Table 19. Uninterruptible power supply units

Part number	Description
55945KX	RT5kVA 3U Rack or Tower UPS (200-240VAC)
55946KX	RT6kVA 3U Rack or Tower UPS (200-240VAC)
55948KX	RT8kVA 6U Rack or Tower UPS (200-240VAC)
55949KX	RT11kVA 6U Rack or Tower UPS (200-240VAC)
55948PX	RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55949PX	RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)

For more information, see the list of Lenovo Press Product Guides in the UPS category at <https://lenovopress.com/servers/options/ups>

Rack cabinets

The BladeCenter H chassis is supported in the rack cabinets that are listed in the following table.

Table 20. Rack cabinets

Part number	Description
201886X	11U Office Enablement Kit
93072PX	25U Static S2 Standard Rack
93072RX	25U Standard Rack
93074RX	42U Standard Rack
93074XX	42U Standard Rack Extension
93084EX	42U Enterprise Expansion Rack
93084PX	42U Enterprise Rack
93604EX	42U 1200mm Deep Dynamic Expansion Rack
93604PX	42U 1200mm Deep Dynamic Rack
93614EX	42U 1200mm Deep Static Expansion Rack
93614PX	42U 1200mm Deep Static Rack
93624EX	47U 1200mm Deep Static Expansion Rack
93624PX	47U 1200mm Deep Static Rack
93634CX	PureFlex™ System 42U Rack
93634DX	PureFlex System 42U Expansion Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93634PX	42U 1100mm Dynamic Rack
99564RX	S2 42U Dynamic Standard Rack
99564XX	S2 42U Dynamic Standard Expansion Rack

For more information, see the list of Lenovo Press Product Guides in the Rack cabinets and options category: <https://lenovopress.com/servers/options/racks>

Rack options

The BladeCenter H chassis supports the rack console switches and monitor kits that are listed in the following table.

Table 21. Rack options

Part number	Description
Monitor kits and keyboard trays	
172317X	1U 17in Flat Panel Console Kit
172319X	1U 19in Flat Panel Console Kit
Console switches	
1754D2X	Global 4x2x32 Console Manager (GCM32)
1754D1X	Global 2x2x16 Console Manager (GCM16)
1754A2X	Local 2x16 Console Manager (LCM16)
1754A1X	Local 1x8 Console Manager (LCM8)
Rack conversion options	
46M5382	Serial Conversion Option (SCO)
46M5383	Virtual Media Conversion Option Gen2 (VCO2)
39M2895	USB Conversion Option (UCO)

For more information, see the list of Lenovo Press Product Guides in the KVM Switches & Consoles category <https://lenovopress.com/servers/options/kvm>

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For your region-specific offers, please ask your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:

<https://www.lenovo.com/us/en/landingpage/lenovo-financial-services/>

Related publications and links

For more information, see the following resources:

- BladeCenter home page
<http://shop.lenovo.com/us/en/systems/servers/blades/bladecenter/>
- IBM US Announcement Letter - BladeCenter H
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-234>
- BladeCenter Information Center
<http://publib.boulder.ibm.com/infocenter/bladectr/documentation/>
- *Installation and User's Guide - BladeCenter H*
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-63306>
- *Problem Determination and Service Guide - BladeCenter H*
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-63570>
- *BladeCenter Products and Technology*, SG24-7523
<http://lenovopress.com/sg247523>
- *BladeCenter Interoperability Guide*
<http://lenovopress.com/bcig>
- *BladeCenter Power Guide*
<http://ibm.com/support/entry/portal/docdisplay?Indocid=LNVO-POWINF>
- *Configuration and Option Guide*
<http://www.ibm.com/systems/xbc/cog/>
- *xREF: System x Server Reference*
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- System x Support Portal
<http://ibm.com/support/entry/portal/>
- IBM System Storage® Interoperation Center
<http://www.ibm.com/systems/support/storage/ssic>

Related product families

Product families related to this document are the following:

- [Blade Chassis](#)

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