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Seg, 09 de Dez de 2013 14:20

Assunto : CATÁLOGOS TÉCNICOS_PE 050-2013_TJ-AM 2 anexos**Para :** cpl@tjam.jus.br

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De : Cristina da Silva <cristina@criarsol.com.br>

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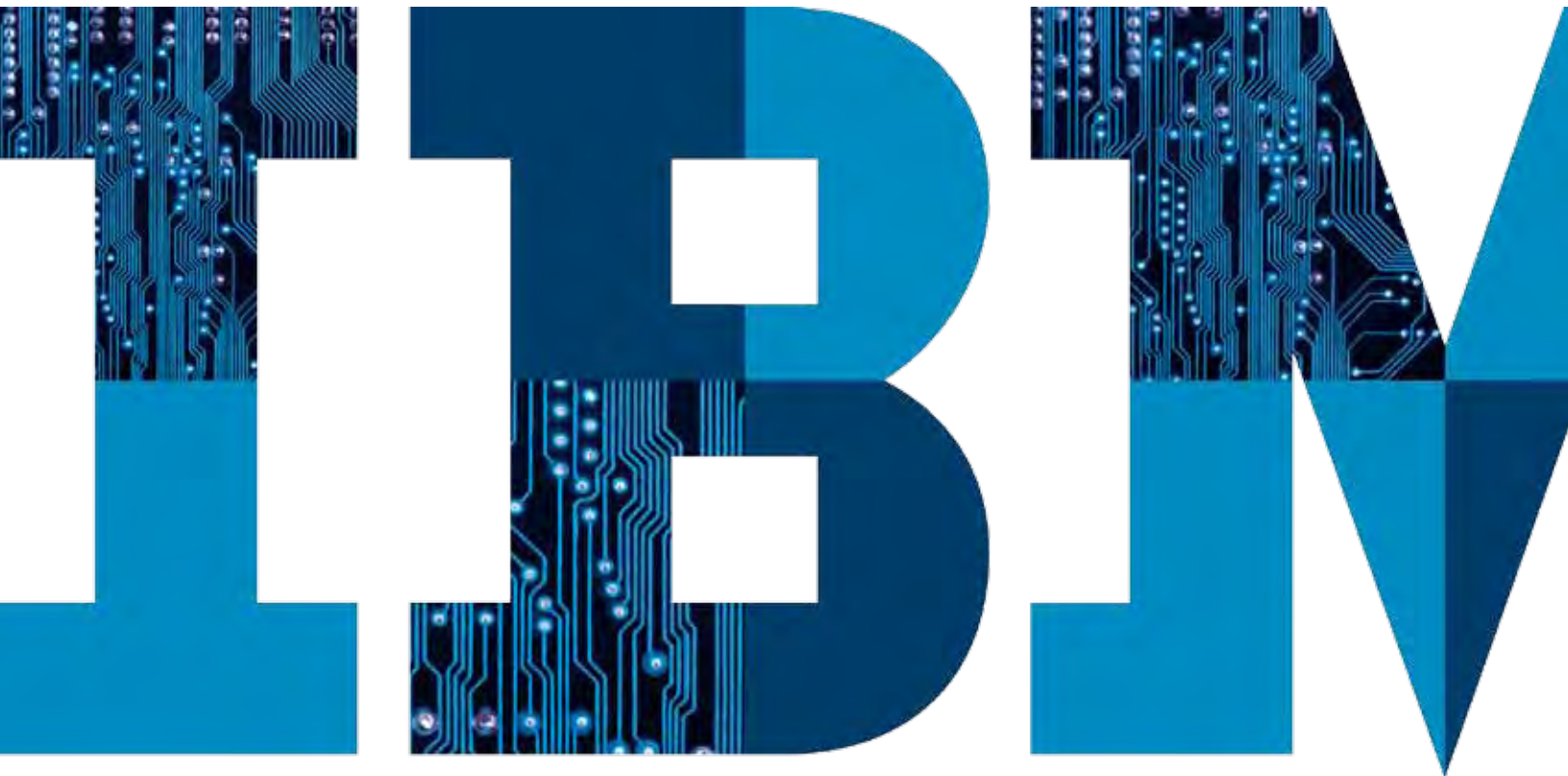
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IBM Systems Director

Optimized and simplified management of IT infrastructures



The priority for administrators is to provide IT resources and services when and where they're needed.

The question is, how?

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For most IT managers today, “overstretched” is an understatement. They are practically drowning in work, putting in long hours performing mundane, repetitive tasks across disparate platforms. With so much effort going into just keeping things running, it should come as no surprise that today, 66 percent of IT budgets are allocated to maintenance.¹

The typical infrastructure is overly complex, poorly integrated and underutilized. It's almost impossible to know precisely what the status of all systems is at any given time. Diverse platforms mean multiple, overlapping management tools and processes, which hurt productivity. Deploying resources to meet service demands can be complicated and inefficient, which drives cost up. The effective operation of such an environment is difficult at best.

Three key issues confront IT administrators:

- **Productivity**—Disparate and poorly integrated management tools, a lack of visibility and insight that can enable proactive management, an inability to effectively manage pools of resources and complex, labor-intensive management processes combine to prevent managers from being as responsive and effective as they could be.
- **Cost control**—Server sprawl, siloed and inflexible systems and poor utilization contribute to infrastructure costs. The complexity and inefficiency of management also drive up operational costs.
- **Service level requirements**—The same issues that hurt productivity and drive up costs also impact service levels. Managers are challenged to find ways to meet the expectations of their stakeholders faster, better and more simply.

It's not easy to get past these challenges, with stagnant budgets and a steady stream of new demands, like the increasing use of analytics or the rapid rollout of new products and services. Fortunately, there is a way to ease the load on administrators, one that addresses key management issues from productivity improvement to meeting service level requirements—while also increasing business agility. It's about a smarter approach to computing built around an optimized, centrally managed, highly automated infrastructure. It's a way to provide IT that adapts to the business, rather than forcing the business to adapt to the infrastructure.

With such an approach, the business has the flexibility to easily deploy and manage both physical and virtual infrastructures—servers, storage, networks, applications—using systems tuned for their workloads to ensure peak performance and efficiency. A well-managed, flexible and robust infrastructure can make critical applications and information more available, reducing both planned downtime and unexpected outages, and increasing service levels. It also forms the basis for the deployment of cloud services, which further enhance business agility and IT effectiveness.

Management is the backbone of this infrastructure, enabling effective and efficient administration of all IT resources in a centralized, coordinated way. Virtualization is its foundation, enabling systems that can be treated as flexible resource pools that make it simpler and faster to get the right resources in place to serve the needs of the business. Yet, without robust management, virtualization cannot fully deliver on this promise. Management is what allows the data center to be optimized.

The IBM Systems Software management portfolio is the integrating force, spanning the data center to bring visibility, automation and control to the infrastructure. The cornerstone of the portfolio is IBM Systems Director, which provides a unified, “single pane of glass” platform for the management of the entire heterogeneous infrastructure—multiple server platforms from x86 to IBM POWER® and mainframe, as well as storage and networking. Systems Director eliminates

multiple layers of management platforms and tools, enabling faster and more flexible deployment of new applications and workloads. A fully integrated solution, Systems Director can reduce the cost of administration by as much as 35 percent² while simplifying tasks and improving service levels.

The Systems Director story is centered on the daily life of the IT manager. This IT professional is under constant pressure to do more with less, be more responsive, increase performance and deliver IT services more reliably. Productivity, cost and service levels—these are the real-world management issues that Systems Director was built to handle. To illustrate how this powerful management platform can address these constant challenges, we’ll look at IBM Systems Director from several different angles.

Productivity: the leading concern of administrators

The immediate priority for administrators has always been to ensure adequate capacity and provide IT resources and services when and where they’re needed, efficiently and reliably. The question is, how? In a typical data center, administrators spend a lot of valuable time and human resources on routine operations. Again and again they have told us that productivity is their leading issue.

There are many interconnected issues that impact productivity. The sheer volume of work, its reliance on human intervention, the complexity of the management tasks, not knowing what’s going on—and most especially the inefficiency of the management tools—all combine to make it difficult to get the job done.

To see why maintaining productivity is such a challenge, consider something as simple as data backup. At B C Jindal Group, a leading Indian business conglomerate, this routine process was having far-reaching effects on the business. Systems were being taken offline, which hurt availability. Valuable processing power was being consumed for backup when it could have been used to run useful workloads.

From the management point of view, though, the biggest issue was how much effort it took. Four people were employed to start, monitor and check the success of each manual backup for 30 servers of various kinds, with a full backup requiring as much as five hours – a tremendous cost in terms of human capital, which carries significant implications for the systems management and staffing resources.

Now, a combination of automated IBM Systems Software data management and IBM System Storage® hardware has reduced the time by half, achieved a 66 percent reduction in storage requirements and made fully automated data backup part of the business-as-usual daily workflow. B C Jindal has been able to save at least one full-time employee equivalent as a result, freeing its staff to work on more urgent tasks. The infrastructure as a whole is now so easy to operate that Jindal now runs the entire enterprise with a single manager.

Productivity is affected by much more than labor-intensive, inefficient processes. The complexity of management is a major factor. A heterogeneous infrastructure usually means multiple tools and management processes. A task like making sure all servers have the correct operating system patches installed is simple in itself, but inefficient if it has to be done manually for many platforms. Administrators have to locate each machine, check its status, reassign its workload, take it offline, run the patch, reboot and check the server, then return it to service. Multiply this by dozens or even hundreds of servers, and in a mixed environment, a separate set of management utilities will be needed for each platform.

IBM Systems Director takes a different approach, providing a “single pane of glass” that combines management functions for all IT assets into a central console, with automated discovery, monitoring and management of assets and workloads. A real-time, dashboard view yields insight that helps the administrator allocate resources more effectively and manage proactively instead of reactively.

Rather than burdening IT managers with multiple screens, interfaces and processes from different vendors, Systems Director brings it all together in one place, with one login. The same platform, energy and image management tools can be used across the entire heterogeneous IBM infrastructure, from System x® to IBM POWER and other operating environments like Linux® on IBM System z.

With a single management layer instead of many, productivity is increased, the task load is simplified, the need for extensive training is eliminated and the chance for human error is lessened. The overall benefit is a marked simplification and streamlining of the management task flow. Systems Director does this through a combination of more effective, consolidated functionality and usability and extensive automation. Together, these can increase staff productivity by up to 20 percent.³

The productivity improvements made possible by Systems Director can have a major impact on the business as a whole. GHY International, a customs brokerage services provider based in Winnipeg, Canada, has a lean IT department with four staff. Those professionals had been spending over 90 percent of their time on server management and basic administration. With a virtualized IBM infrastructure and Systems Director, that workload is now on the order of five percent. According to Nigel Fortilage, Vice President of IT and CIO at GHY International, “The effect on productivity was astounding because it allowed us to concentrate on new services to support GHY’s business strategy. We were able to add hundreds of thousands of dollars of value to the business as a result.”

Systems Director makes key management tasks more efficient through automation that makes better use of the IT manager’s time. In a virtualized infrastructure, for instance, provisioning a new workload is a frequently recurring task that takes up valuable time. Systems Director allows the process to be automated using a library of preconfigured system images. By reducing manual intervention, the server goes online sooner and the manager spends less time on the task. That means faster time-to-value and greater business agility.

Using Systems Director, IT resources can be more closely aligned with the business. For example, a line-of-business manager can launch a data analysis and have the capacity provisioned automatically. With no direct involvement at all, the cost of management goes down and staff productivity rises. And the IT administrator can spend more time on value-added work, like the deployment of new servers and resources, new applications, new services and the development of strategic projects for the company.

The same automated management processes that increase productivity also help reduce risk. With less human intervention and fewer layers of management, there is less chance for error. The image library that makes resource allocation so efficient, for example, also helps to ensure that server deployment is done correctly. Once the configurations are set, there is no need for the manager to intervene.

Cost control: doing more with less

After productivity, the second major concern for IT managers is a clear mandate to meet capacity and performance demands without increasing spending. Many budgets remain at 2005 levels,⁴ while other firms are pulling back on spending. Forrester Research projections show decreases in operating expenditures of 36 percent, and capital expenditures of 32 percent.⁵

At the same time, service level requirements are increasing. According to IDC,⁶ in 2011 the amount of information created and replicated will exceed 1.8 zettabytes—1.8 trillion gigabytes—a nine-fold increase in just five years. Between 2007 and 2010, digital data grew tenfold, and 90 percent of that information is unstructured—requiring significant effort to understand and analyze. These factors are driving a vicious cycle in the data center. Inflexible IT is unable to respond to the new demands, requiring more investment and more server sprawl. Costs—for equipment, power and cooling—soar, and management becomes more complex.

With many companies not allowing IT spending to grow, administrators are looking for ways to ensure adequate capacity and deliver services within the limits of strict budget constraints. A smarter computing infrastructure addresses these issues by making better use of IT assets and through the cost savings made possible by more effective management. Reducing the time and effort spent on administration yields considerable operational cost savings, while improving flexibility, availability and utilization allows capital spending to be deferred or even avoided entirely.

Focusing only on technology to reduce costs, however, is only a partial solution; it must be managed well to deliver savings. The United Kingdom's City and County Healthcare Group learned this lesson with its old infrastructure, which spread servers among a small number of branch offices, all connected to central systems at the head office. It was relatively low cost from an infrastructure standpoint, but it had a very high management overhead. A consolidated, cloud-based data center was established with IBM Systems Director running on all servers. Achieving a single view and a centralized, remote point of control has made the group administrators' tasks far easier, allowing them to be more proactive, responsive and efficient, while still being cost-effective.

Knowing precisely which assets are likely to be impacted by a new business initiative can also allow the administrator to plan ahead rather than manage reactively. By knowing its true requirements at all times thanks to close monitoring with Systems Director, B C Jindal has been able to leverage virtualization to upgrade its infrastructure in exact step with business demands. The new infrastructure is so well utilized that the company has been able to reduce the number of servers it needs to buy—thus reducing its predicted capital expenditure by 50 percent.

Another way that companies are cutting costs is by physically reducing the size of the infrastructure. Fewer servers mean less capital cost, lower license fees and less power and cooling. It also means less maintenance and management to begin with, which allows staff to engage in more productive activities. Adding Systems Director to the mix cuts the cost of administration still further.

Codorní, Spain's leading producer of sparkling wine, had a mix of servers and miscellaneous storage systems that was vulnerable to outages and manually managed at a very high cost. Introducing new services and applications was slow and required the purchase of more servers, which then had to be configured and deployed. A cloud infrastructure managed by IBM Systems Director has cut administration costs in half and allowed the company to shrink its data center by 70 percent—while increasing the availability of critical SAP systems and data. Codorní was actually able to both improve service levels and cut costs without making compromises.

Managing virtualized systems as a cloud allows administrators to add scale without adding complexity. It reverses the vicious cycle of server sprawl, creating a virtuous cycle that allows the business to effectively double its capacity for IT service on a flat budget by dynamically adjusting workloads among all available resources. Systems Director is the key to this kind of improvement. IBM Systems Director makes it simpler to deploy, manage and maintain virtualized assets—servers, storage and networks—so a new physical infrastructure does not have to be purchased to meet increasing service demands.

By providing greater visibility and insight into asset use, along with the ability to easily build resource pools to support dynamic workloads, Systems Director allows administrators to manage IT resource utilization far more effectively. The result is a more streamlined, less costly and less complex infrastructure.

Systems Director's ability to manage across platforms from blade to mainframe, as well as storage and networking, has important implications for increasing the cost-effectiveness of IT. Knowing where workloads are running and how they're performing by monitoring through the Systems Director console can help improve service and utilization. **With the insight provided by Systems Director, workloads can be shifted to the most suitable platform and assets reallocated remotely, even automatically if required.** That optimizes the use of IT assets and allows the data center to be smaller, which produces a cascade of cost savings—less cost for power, floor space, cooling and server licensing.

Systems Director also allows direct reduction of energy use through hardware control. Using IBM Systems Director Active Energy Manager, managers can monitor the power consumption and temperature of individual system components—and even control them. CPU performance and power consumption can be “capped,” for example, to reduce current draw. Active Energy Manager can also identify temperature and power usage issues, allowing administrators to proactively address them to reduce cooling requirements and improve reliability. New York utility Consolidated Edison is putting this capability to good use by teaming with IBM to help its customers build more energy-efficient data centers. By identifying energy issues using Active Energy Manager and leveraging virtualization technology to reduce power consumption, some customers are seeing savings of 40 percent or more.

Maintaining service levels: the core task of management

The one thing that IT managers must stay focused on above all else is delivery of services. Productivity and resource constraints are very real concerns, but keeping the systems online, protected and performing is the fundamental goal of all that the administrator does.

In the current competitive environment, corporate leaders are pushing for increased business agility, and it's up to IT managers to enable it in addition to all of their other tasks. Administrators have to maintain the infrastructure, but they can't let that get in the way of meeting service level requirements.

As shown in Figure 1, even with a smarter computing infrastructure, management challenges remain. Administrators still need to provide service as reliably and cost-effectively as possible. The difference is that they now need to do it more flexibly and efficiently than ever.

Old management methods—planning weeks or months in advance, purchasing and installing new servers, and manually managing workloads and processes—simply cannot keep up with today's business needs. Managers now work in an environment where requirements change minute by minute. By linking management tasks together and automating them, Systems Director allows managers to focus on managing workloads and meeting service level agreements.

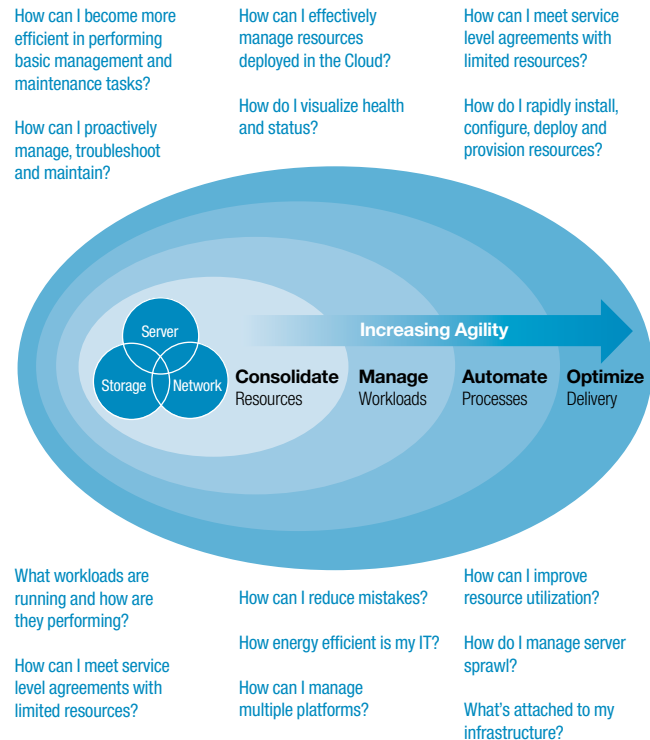


Figure 1: IBM Systems Director creates a vital link between the daily reality of IT management and the strategic needs of the business. It allows IT professionals to respond to the organization's need for improved service delivery in a way that conventional management platforms cannot.

This advanced workload management can radically change how IT services are consumed. The Chinese city of Wuxi, for example, has deployed a shared cloud environment—the Wuxi Cloud Center—and opened it up to the 150 companies that occupy the city’s New Town Science and Education Industrial Park. Each business has, in effect, access to an enterprise-class data center without having to tie up capital in hardware. Centralized management of the environment is what makes the pay-as-you-use business model work.

The control provided by Systems Director maximizes the efficient use of the IT infrastructure. Management of servers, storage and networks becomes automated and transparent, allowing the infrastructure to adapt rapidly to new workload demands. This means that resources can be deployed more quickly for faster time-to-market, a capability that benefits China Telecom’s Jiangxi Subsidiary. A shared-services approach, enabled through automated management, has given the company a more fluid and flexible business model. Developing a new business application had taken three to four months; now it can be done in two or three days. Along the way, hardware utilization has gone up by 50 percent, allowing the company to make the most of its IT investments and avoid additional capital expenses.

The automated discovery, reporting, monitoring and remote management features of Systems Director also play an important role in maintaining quality of service. The typical IT infrastructure is a complex construct, with many components and dependencies. Approximately 60 percent of infrastructure issues occur because of changes in the environment—such as a system software patch unexpectedly causing

an application to crash, or a network traffic bottleneck being caused by a new remote backup initiative. By helping managers understand the impact of resource changes and new workloads, Systems Director provides insights that allow these issues to be avoided completely,

Achieving timely insight is also essential to recovery efforts. If a manager can be alerted of a server crash anytime, anywhere, he can respond immediately (and even address the issue remotely through the Systems Director console) to minimize the impact on the business.

Automated monitoring can allow more proactive management and keep systems running. For example, California’s Antelope Valley Hospital had always run its data center reactively, in break-fix mode. A week after installing Systems Director, administrators were alerted that a RAM module in one of its servers was going bad. The part was replaced before it failed and the system stayed online, with absolutely no impact on the hospital community.

The visibility provided by Systems Director also helps ensure long-term availability by giving managers the ability to plan better for growth. For example, historical workload data can be analyzed to make future predictions about when infrastructure assets will approach the limits of their capacity. The infrastructure can then be extended proactively rather than reacting to a shortage of resources. This kind of insight is virtually impossible to achieve without a consolidated view of systems.

A flexible management platform that evolves with the business

The component-based architecture of IBM Systems Director provides fully integrated monitoring and management of heterogeneous IBM infrastructure environments, delivered through the core “single pane of glass” platform and associated plug-ins that integrate seamlessly with third-party management tools.

The core components include a console and management server with intelligent “agents” that allow the automated discovery, monitoring and management of both physical and virtual resources. Plug-ins such as IBM Systems Director VMControl,TM Active Energy Manager, Network Control and Storage Control extend the base functions, providing capabilities ranging from simplified, automatic virtual image management to the direct monitoring and control of hardware components to control energy usage. These capabilities can be complemented by IBM Tivoli,[®] which acts as a “manager of managers” to extend the benefits of centralized management across multivendor environments.

The platform is constantly being updated to improve its effectiveness and usability, and to stay in lockstep with emerging IT management needs and technologies. IBM Systems Director VMControl, for example, works with all hypervisors, including the rapidly emerging, open-source KVM, as well as established ones like VMWare ESXi, IBM z/VM[®] and IBM PowerVM.[®] Systems Director reflects the IBM commitment to customer choice, helping to promote flexibility.

IBM is also enhancing the capabilities of its hardware offerings to complement this smarter approach to computing, by extending the virtualization technology built into IBM POWER to other IBM platforms, including System x and System z, for example. This makes it simpler to deploy a consolidated, virtualized infrastructure that is ideally suited for the workloads it runs.

Bringing it all together

For IT managers, a smarter approach to computing takes more than an advanced infrastructure. The ability to better manage information and systems – to become more productive, save money and drive positive business outcomes – is all-important.

IBM Systems Director provides the essential bridge between the daily reality of the IT manager and the strategic goals of the organization. Systems Director brings simplification to IT management, which means faster time-to-value, increased productivity and reduced cost. It streamlines management, allowing the business to make the most of its infrastructure – reducing complexity, improving performance and responsiveness, and enabling scalability without compromise.

By bringing together virtualization, visibility, control and automation to yield a new, streamlined and optimized way of doing business, IBM allows smarter computing to drive business transformation – and success on a smarter planet.

Find out more

To learn more about how IBM Systems Director and other offerings in the IBM Systems Software portfolio can transform IT management, contact your IBM representative or visit us at:

ibm.com/systems/software/director

ibm.com/systems/software



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¹ Teodoro, Irwin. "Ten IT Talking Points Your CIO Will Love." Computerworld. December 16, 2009. http://www.computerworld.com/s/article/9142393/Ten_IT_Talking_Points_Your_CFO_Will_Love?source=CTWNLE_nlt_mgmt_2009-12-17.

² *Value Proposition for IBM Systems Director: Challenges of Operational Management for Enterprise Server Installations*. IDC Management Brief. 2008.

³ Ibid.

⁴ Teodoro, Irwin. "Ten IT Talking Points Your CIO Will Love." Computerworld. December 16, 2009. http://www.computerworld.com/s/article/9142393/Ten_IT_Talking_Points_Your_CFO_Will_Love?source=CTWNLE_nlt_mgmt_2009-12-17.

⁵ Forrester Research, Base 695 NA IT organizations

⁶ Gantz, John and Reinsel, David. *Extracting Value From Chaos*. IDC iView. June 2011



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Highlights

- Delivers high performance, energy efficiency and versatility to run the most demanding applications in larger data centers
 - Reduces energy bill with leadership high-efficiency power supplies that are 94 percent efficient and 80 PLUS® Platinum Certified¹
 - Provides more than 12 percent greater performance per watt compared to the competition²
 - Protects your investment by being compatible with the entire IBM BladeCenter® family
-

IBM BladeCenter H

Extending the value of blades to higher performance in an enterprise environment

In today's high-demand enterprise environment, organizations need a reliable infrastructure to run compute-intensive applications with minimal maintenance and downtime. IBM BladeCenter H is a powerful platform built with the enterprise customer in mind, providing industry-leading performance, innovative architecture and a solid foundation for virtualization.

Powerful performance

This next-generation chassis is a workhorse—it runs applications quickly and efficiently, enabling organizations to maximize their investment and succeed in a highly competitive market. The powerful BladeCenter H delivers the performance customers need to make informed decisions.

With IBM Open Fabric Manager, BladeCenter H can help organizations run applications even more efficiently by delivering a flexible, open and connected infrastructure.

Driving innovation

IBM continues to build on its reputation for helping customers find innovative IT solutions with BladeCenter H, which delivers even more capabilities to the BladeCenter family. The 9U chassis provides the



standard BladeCenter functionalities with the added performance of high-speed I/O and the fastest blades. Other highlights include:

- High-speed fabric with eight data channels to every blade, four of which can be 10 Gb
- Leadership high-efficiency power supplies
- Flexible, scalable design so the system can grow as your business grows
- Sustainable platform life for enhanced investment protection
- Multi-Switch Interconnect Module for additional connectivity to blade servers
- Light path diagnostics for fast, simple, accurate troubleshooting to help guard against system downtime

BladeCenter H also drives innovation through its open architecture, supporting industry-standard I/O switches from Cisco, Brocade and others, so organizations have more choice and flexibility when it comes to their IT environment. Likewise, IBM's affiliation with blade.org helps open the architecture even more by supporting an online, collaborative environment to promote advances in technology solutions.

Managing growth, minimizing risk

With its unsurpassed architecture, BladeCenter H efficiently integrates servers, storage, networking, I/O and applications, enabling organizations to build flexible IT infrastructures using common building blocks. This helps customers control costs by protecting their investments—and with a powerful set of tools that are open and equally integrated, organizations can quickly deploy and easily manage their systems.

As a rack-dense, space saving chassis, BladeCenter H provides a superior foundation for virtualization. And in a virtualized environment, organizations can run a more flexible, better utilized and potentially more cost-effective IT infrastructure with a common management construct.



Easy and energy efficient

Because BladeCenter H is more than 12 percent more energy efficient than the HP C-class chassis,² organizations know they're making the right choice when it comes to using less power. Innovative tools such as IBM Systems Director Active Energy Manager™ track power usage so organizations can better manage energy and help prevent outages. And not only does BladeCenter H help organizations go green and save, it also makes it easy to deploy, integrate and manage applications—so customers can focus on their business and not on their IT.

IBM: The right choice

As an industry leader in innovative IT systems, IBM delivers yet another important solution for the IT environment. BladeCenter H is the ideal chassis for running the most demanding applications and simulations at high speeds, giving enterprise organizations a distinct advantage over competitors.



**Run Cool
Run Reliably
Run With 80 PLUS®**

www.80PLUS.org

The BladeCenter family of products includes five chassis—BladeCenter E, BladeCenter H, BladeCenter HT, BladeCenter S and BladeCenter T—that meet a wide range of customer needs.

BladeCenter H delivers high performance by supporting 4X InfiniBand and 10 Gb Ethernet switches. It also supports the largest power supplies and the entire IBM family of blade servers.

BladeCenter H helps reduce energy costs with leadership high-efficiency power supplies that are 94 percent efficient and 80 PLUS Platinum Certified.

IBM BladeCenter H at a glance

Form factor/height	Rack-mount chassis/9U
Blade bays	Up to 14
Switch modules	Up to four traditional, up to four high-speed, and up to four bridge module bays
Power supply module	Up to four hot-swap and redundant 2980 W ac high-efficiency power supplies with load-balancing and failover capabilities. Operating at 200-240 V
Cooling modules	Two hot-swap and redundant blowers standard, additional fan packs on power supplies
Systems management hardware	Advanced Management Module standard; add an optional Advanced Management Module for redundancy
I/O ports	USB-based keyboard, video, mouse (KVM), Ethernet, USB
Media	Two USB connections and an optional DVD multiburner
Systems management software	Systems management and trial deployment tools
Predictive Failure Analysis	Internal storage, processors, blowers, memory
Light path diagnostics	Blade server, processor, memory, power supplies, blowers, switch module, management module, internal storage and expansion card
Limited warranty	Three-year customer replaceable unit and onsite limited warranty
External storage	Support for IBM System Storage® solutions (including DS and NAS family of products) and many widely adopted non-IBM storage offerings

For more information

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U.S. ibm.com/systems/bladecenter

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¹ 80 PLUS Organization, 2010, visit www.80plus.org for more information.

² Edison Group, Inc., 2010, visit www.TheEdison.com for more information.



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IBM BladeCenter H

IBM Redbooks Product Guide

IBM® BladeCenter® remains an innovative solution to running business solutions. IBM 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 IBM BladeCenter H.



Figure 1. The IBM BladeCenter H

Did you know?

IBM 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 IBM 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 IBM BladeCenter blades, helping provide performance and investment protection.
- IBM 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.
- IBM BladeCenter H supports port speeds of up to 40 Gbps.
- IBM BladeCenter H provides up to 1.92 Tbps of switching capacity with up to four IBM 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 IBM 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 IBM BladeCenter H chassis.

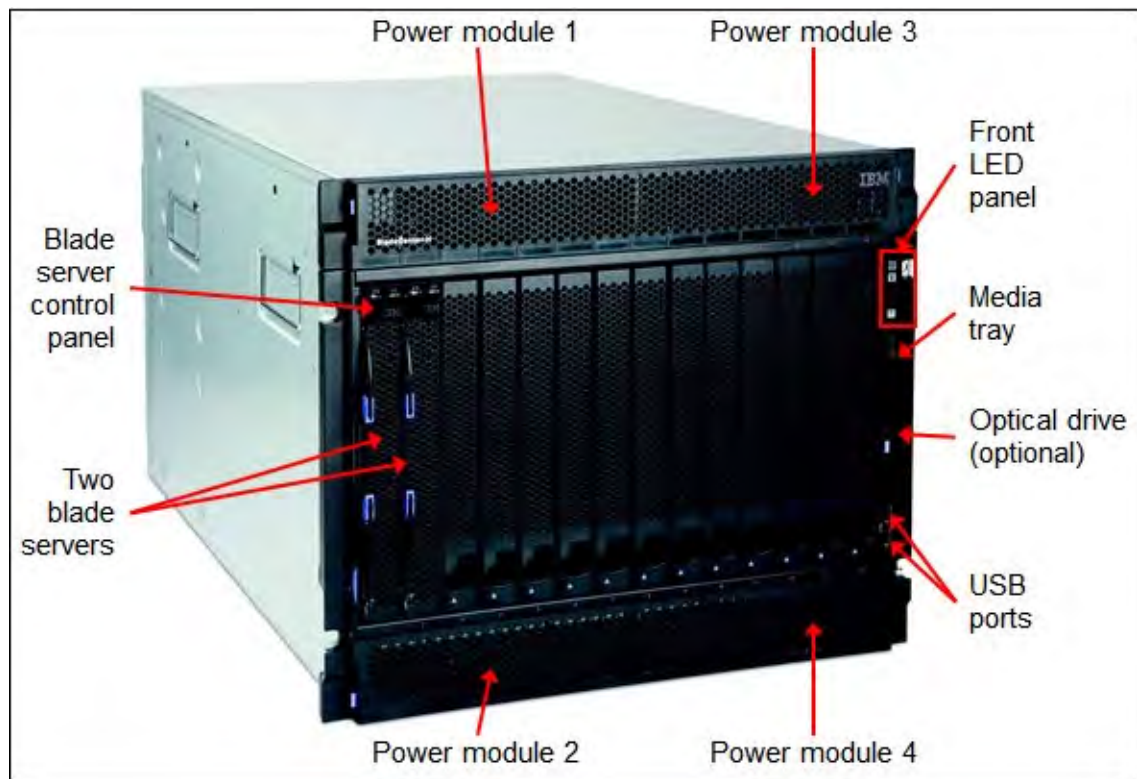


Figure 2. Front of the IBM BladeCenter H chassis

Figure 3 shows the rear of the IBM BladeCenter H chassis

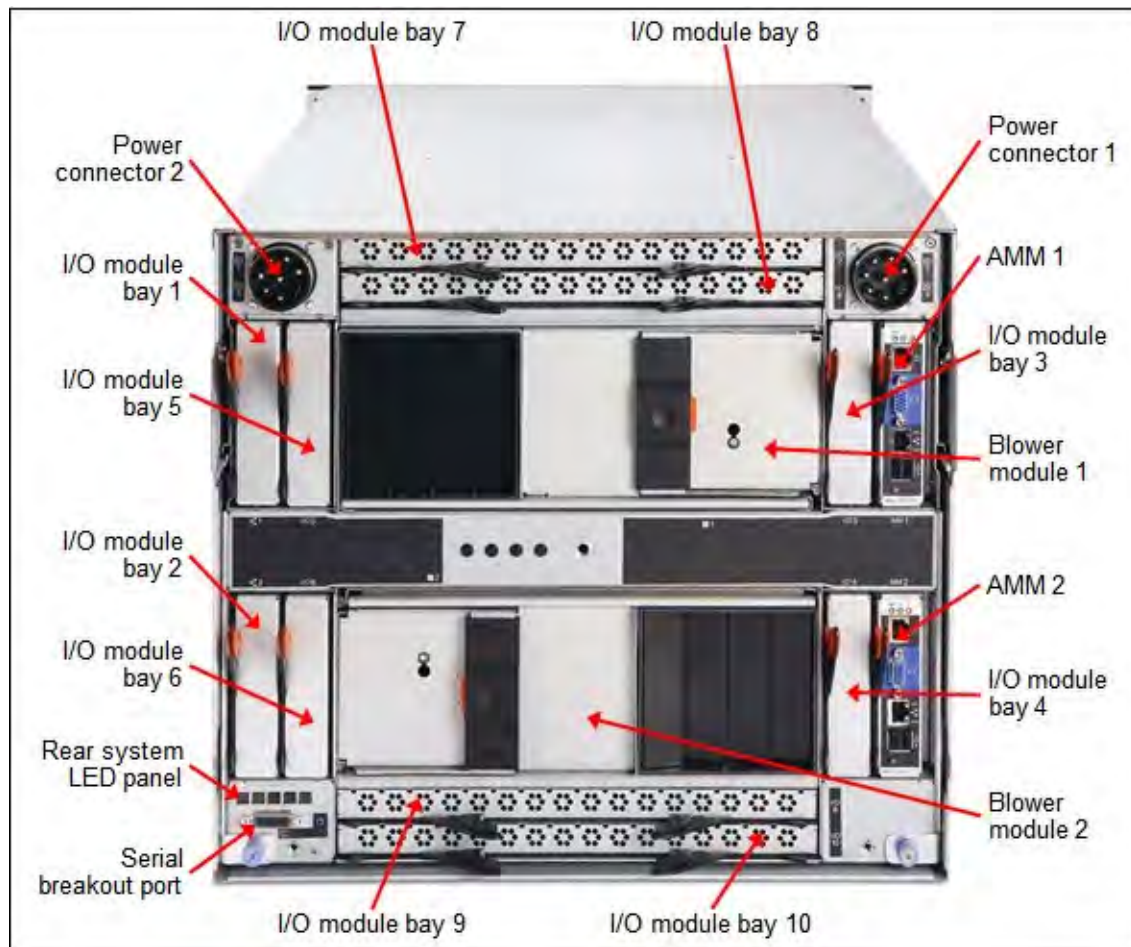


Figure 3. Rear of the IBM BladeCenter H chassis

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 (standard on IBM SmartCloud® models).
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	IBM Calibrated Vectedored 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 IBM ServicePacs: 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.

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 IBM Server Connectivity Module 2x Brocade Converged 10GbE Switch Module	2x IBM Server Connectivity Module 2x Cisco Nexus 4001I Switch Module	2x IBM Server Connectivity Module 2x IBM 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 IBM 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 country-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 IBM 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) BladeCenter HS22V (7871)	130 W	None	14	None	14
	95 W	6+6	14	14	14
	Up to 80 W	14	14	14	14
BladeCenter HS23 (7875)	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

For the latest information about the servers that are supported in the IBM BladeCenter H chassis, see IBM ServerProven® at <http://ibm.com/servers/eserver/serverproven/compat/us/>.

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 IBM 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 IBM 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 Figure 4.

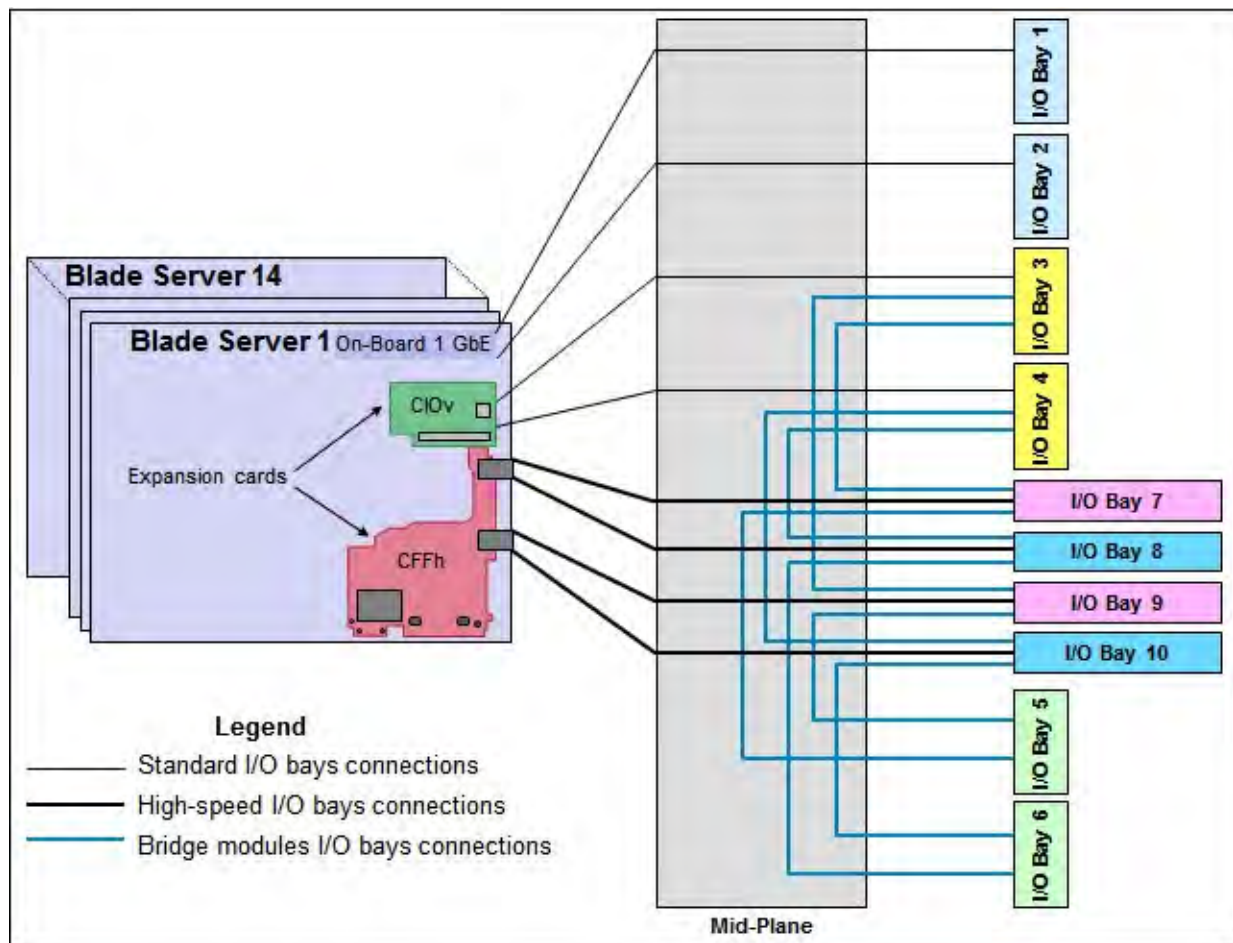


Figure 4. BladeCenter H I/O topology

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 IBM 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 (x-config / e-config)	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	Bay 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*
IBM 1/10Gb Uplink Ethernet Switch Module	44W4404	1590 / 1590	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
IBM L2/3 Copper GbE Switch Module	32R1860	1495 / 3212	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
IBM L2/3 Fiber GbE Switch Module	32R1861	1496 / 3213	Y	Y	Y	Y	N	N	Y*	Y*	Y*	Y*
IBM L2-7 Gb Ethernet Switch Module	32R1859	1494 / 3211	Y	Y	Y	Y	N	N	N	N	N	N
IBM 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
IBM 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)	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	Bay 10
4 Gb Fibre Channel												
Cisco 4Gb 20 port FC Switch Module#	39Y9280	2983 / 3242	N	N	Y	Y	N	N	N	Y*	N	Y*
Cisco 4Gb 20 port FC Switch Module	44E5696	A3FH / 3242	N	N	Y	Y	N	N	N	Y*	N	Y*
Cisco 4Gb 10 port FC Switch Module#	39Y9284	2984 / 3241	N	N	Y	Y	N	N	N	Y*	N	Y*
Cisco 4Gb 10 port FC Switch Module	44E5692	A3FG / 3241	N	N	Y	Y	N	N	N	Y*	N	Y*
8 Gb Fibre Channel												
Brocade Enterprise 20-port 8Gb SAN Switch	42C1828	5764 / none	N	N	Y	Y	N	N	N	Y*	N	Y*
Brocade 20-port 8Gb SAN Switch Module	44X1920	5481 / 5869	N	N	Y	Y	N	N	N	Y*	N	Y*
Brocade 10-port 8Gb SAN Switch Module	44X1921	5483 / 5045	N	N	Y	Y	N	N	N	Y*	N	Y*
QLogic 20-Port 8Gb SAN Switch Module	44X1905	5478 / 3284	N	N	Y	Y	N	N	N	Y*	N	Y*
QLogic 20-Port 4/8Gb SAN Switch Module	88Y6406	A24C / none	N	N	Y	Y	N	N	N	Y*	N	Y*
QLogic 8Gb Intelligent Pass-thru Module	44X1907	5482 / 5449	N	N	Y	Y	N	N	N	Y*	N	Y*
QLogic 4/8Gb Intelligent Pass-thru Module	88Y6410	A24D / none	N	N	Y	Y	N	N	N	Y*	N	Y*
QLogic Virtual Fabric Extension Module	46M6172	4799 / none	N	N	Y	N	Y	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)	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	Bay 10
SAS modules												
SAS Connectivity Module	39Y9195	2980 / 3267	N	N	Y	Y	N	N	N	N	N	N
InfiniBand modules												
Voltaire 40Gb InfiniBand Switch Module	46M6005	0057 / 3204	N	N	N	N	N	N	Y*		Y*	
Pass-through modules												
Intelligent Copper Pass-thru Module	44W4483	5452 / 5452	Y	Y	Y	Y	N	N	Y†	Y†	Y†	Y†
10Gb Ethernet Pass-thru Module	46M6181	1641 / 5412	N	N	N	N	N	N	Y	Y	Y	Y
Interconnect modules												
IBM Multi-Switch Interconnect Module	39Y9314	1465 / 3239	N	N	N	N	N	N	Y*		Y*	

* 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 IBM Redbooks® Product Guides:

- Ethernet switches
<http://www.redbooks.ibm.com/portals/BladeCenter?Open&page=pg&cat=ethswitches>
- Fibre Channel switches
<http://www.redbooks.ibm.com/portals/BladeCenter?Open&page=pg&cat=fcswitches>

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	IBM UltraSlim Enhanced SATA DVD-ROM	1	-
46M0902	4163	IBM UltraSlim Enhanced SATA Multi-Burner	1	94x, 95x, 96x

IBM 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.

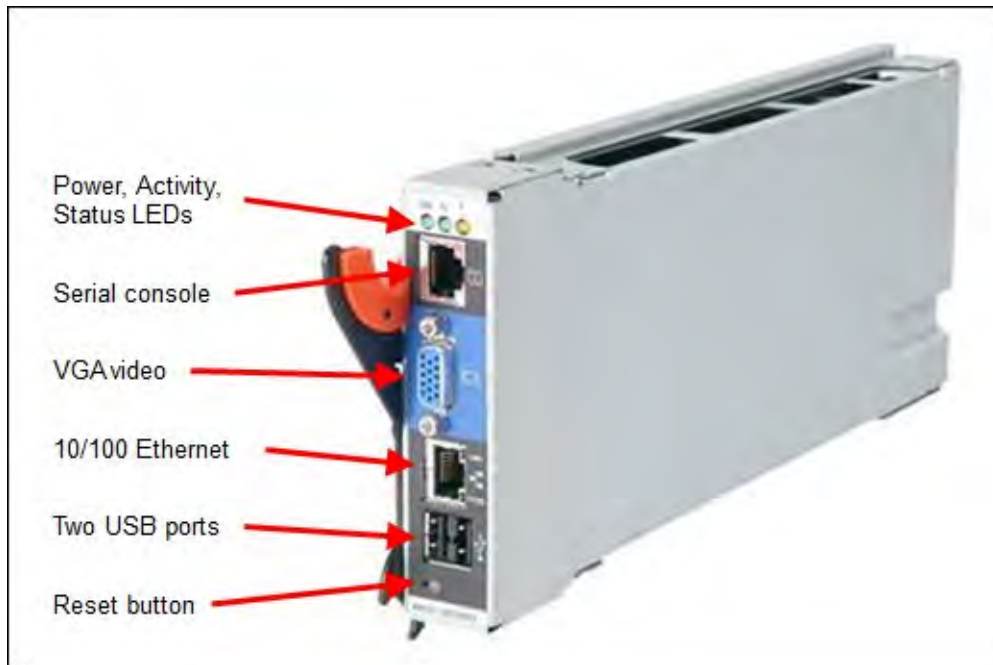


Figure 5. Advanced Management Module

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 IBM 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:

- *IBM BladeCenter Advanced Management Module Installation Guide*, found at: <http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5073392>
- *IBM 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 IBM 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	IBM 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 IBM 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	IBM 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 IBM BladeCenter H has a 3-year onsite warranty with 9x5 next-business-day terms. IBM offers the warranty service upgrades through IBM ServicePac®. The IBM ServicePac is a series of prepackaged 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.

IBM ServicePac offerings are country-specific. Each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePac might be available in a particular country. For more information about IBM ServicePac offerings available in your country, see the IBM ServicePac Product Selector at <https://www-304.ibm.com/sales/gss/download/spst/servicepac>.

Table 14 explains the warranty service definitions in more detail.

Table 14. Warranty service definitions

Term	Description
IBM onsite repair (IOR)	A service technician comes to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your client's location within two hours after remote problem determination is complete. We provide 24-hour service, every day, including IBM holidays.
24x7x4 hour	A service technician is scheduled to arrive at your client's location within four hours after remote problem determination is complete. We provide 24-hour service, every day, including IBM holidays.
9x5x4 hour	A service technician is scheduled to arrive at your client's location within four business hours after remote problem determination is complete. We provide service from 8:00 a.m. to 5:00 p.m. in the client's local time zone, Monday through Friday, excluding IBM holidays. If it is after 1:00 p.m., and it is determined that onsite service is required, the client can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician will arrive by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your client's location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. to 5:00 p.m. in the client's local time zone, Monday through Friday, excluding IBM holidays.

In general, the following types are the types of IBM ServicePacs that are available for the IBM BladeCenter H:

- Warranty and maintenance service upgrades:
 - One, two, three, four, or five years of 9x5 or 24x7 service coverage
 - Onsite repair from the next business day to four or two hours
 - One or two years of warranty extension

Regulatory compliance

The chassis conforms to the following standards:

- 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 IBM System x® sales channel. The servers might support other IBM 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
2072LEU	IBM Storwize V3700 LFF Expansion Enclosure
2072SEU	IBM Storwize V3700 SFF Expansion 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
1746A2E	IBM System Storage EXP3512 Express Storage™ Expansion Unit
1746A4D	IBM System Storage DS3524 Express Dual Controller Storage System
1746A4S	IBM System Storage DS3524 Express Single Controller Storage System
1746A4E	IBM System Storage EXP3524 Express Storage Expansion Unit
IBM System Storage DS3950 (5020)	
181494H	IBM System Storage DS3950 Model 94
181498H	IBM System Storage DS3950 Model 98
181492H	IBM System Storage EXP395 Expansion Unit

For more information, see the list of IBM Redbooks Product Guides in the Storage Systems category at <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=externalstorage>.

External backup units

The blade servers that are installed in the BladeCenter H chassis support the external backup attachment options that are listed in Table 16.

Table 16. External backup options (Part 1)

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	IBM DDS Generation 5 USB Tape Drive
39M5636	IBM DDS Generation 6 USB Tape Drive
43W8478	IBM Half High LTO Gen 3 SAS Tape Drive
44E8895	IBM Half High LTO Gen 4 SAS Tape Drive
49Y9898	IBM Half High LTO Gen 5 Internal SAS Tape Drive

Table 16. External backup options (Part 2)

Part number	Description
External backup units*	
3628L3X	IBM Half High LTO Gen 3 External SAS Tape Drive (with US power cord)
3628L4X	IBM Half High LTO Gen 4 External SAS Tape Drive (with US power cord)
3628L5X	IBM Half High LTO Gen 5 External SAS Tape Drive (with US power cord)
3628N3X	IBM Half High LTO Gen 3 External SAS Tape Drive (without power cord)
3628N4X	IBM Half High LTO Gen 4 External SAS Tape Drive (without power cord)
3628N5X	IBM 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 IBM 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 IBM Redbooks Product Guides in the Backup units category at <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape>.

Top-of-rack Ethernet switches

The chassis supports connectivity to the top-of-rack Ethernet switches that are listed in Table 17.

Table 17. IBM System Networking - Top-of-rack switches

Part number	Description
IBM System Networking - 1 Gb top-of-rack switches	
0446013	IBM System Networking RackSwitch™ G8000R
7309CFC	IBM System Networking RackSwitch G8000F
7309CD8	IBM System Networking RackSwitch G8000DC
7309G52	IBM System Networking RackSwitch G8052R
730952F	IBM System Networking RackSwitch G8052F
427348E	IBM Ethernet Switch J48E
6630010	Juniper Networks EX2200 24 Port
6630011	Juniper Networks EX2200 24 Port with PoE
6630012	Juniper Networks EX2200 48 Port
6630013	Juniper Networks EX2200 48 Port with PoE
IBM System Networking - 10 Gb top-of-rack switches	
7309DRX	IBM System Networking RackSwitch G8264CS (Rear to Front)
7309DFX	IBM System Networking RackSwitch G8264CS (Front to Rear)
0446017	IBM System Networking RackSwitch G8124R
7309BF9	IBM System Networking RackSwitch G8124F
7309BD5	IBM System Networking RackSwitch G8124DC
7309BR6	IBM System Networking RackSwitch G8124ER
7309BF7	IBM System Networking RackSwitch G8124EF
7309G64	IBM System Networking RackSwitch G8264R
730964F	IBM System Networking RackSwitch G8264F
7309CR9	IBM System Networking RackSwitch G8264TR
7309CF9	IBM System Networking RackSwitch G8264TF
0719410	Juniper Networks EX4500 - Front to Back Airflow
0719420	Juniper Networks EX4500 - Back to Front Airflow
IBM System Networking - 40 Gb top-of-rack switches	
8036ARX	IBM System Networking RackSwitch G8316R
8036AFX	IBM System Networking RackSwitch G8316F

For more information, see the list of IBM Redbooks Product Guides in the Top-of-rack switches category at <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tor>.

Power distribution units

Power planning for an IBM BladeCenter H is strongly recommended. For details about possible power configurations, see the *IBM BladeCenter Power Guide*, found at <http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4401>.

The chassis supports attachments to the power distribution units (PDUs) that are listed in Table 18.

Table 18. Power distribution units

Part number	Description
Switched and monitored PDUs	
46M4002	IBM 1U 9 C19/3 C13 Active Energy Manager DPI PDU
46M4003	IBM 1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU
46M4167	IBM 1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU
46M4134	IBM 0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU
46M4140	IBM 0U 12 C19/12 C13 50A 3 Phase PDU
Enterprise PDUs	
71762MX	IBM Ultra Density Enterprise PDU C19 PDU+ (WW)
71762NX	IBM Ultra Density Enterprise PDU C19 PDU (WW)
71763MU	IBM Ultra Density Enterprise PDU C19 3 phase 60A PDU+ (NA)
71763NU	IBM 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	IBM 0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	IBM 0U 12 C19/12 C13 32A 3 Phase PDU

For more information, see the list of IBM Redbooks Product Guides in the Power infrastructure category at <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power>.

Uninterruptible power supply units

The IBM BladeCenter H chassis supports attachments to the uninterruptible power supply units listed in Table 19.

Table 19. Uninterruptible power supply units

Part number	Description
21303RX	IBM UPS 7500XHV
21304RX	IBM UPS 10000XHV
53956AX	IBM 6000VA LCD 4U Rack UPS (200 V/208 V)
53956KX	IBM 6000VA LCD 4U Rack UPS (230 V)
53959KX	IBM 11000VA LCD 5U Rack UPS (230V)

For more information, see the list of IBM Redbooks Product Guides in the Power infrastructure category at <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power>.

Rack cabinets

The IBM BladeCenter H chassis is supported in the rack cabinets that are listed in Table 20.

Table 20. Rack cabinets

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

For more information, see the list of IBM Redbooks Product Guides in the Rack cabinets and options category at <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack>.

Rack options

The IBM BladeCenter H chassis supports the rack console switches and monitor kits that are listed in Table 21.

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	IBM Global 4x2x32 Console Manager (GCM32)
1754D1X	IBM Global 2x2x16 Console Manager (GCM16)
1754A2X	IBM Local 2x16 Console Manager (LCM16)
1754A1X	IBM Local 1x8 Console Manager (LCM8)
Rack conversion options	
46M5382	IBM Serial Conversion Option (SCO)
46M5383	IBM Virtual Media Conversion Option Gen2 (VCO2)
39M2895	IBM USB Conversion Option (UCO)

For more information, see the list of IBM Redbooks Product Guides in the Rack cabinets and options category at <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack>.

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Related publications and links

For more information, see the following resources:

- BladeCenter home page
<http://ibm.com/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 - IBM BladeCenter H*
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- *Problem Determination and Service Guide - BladeCenter H*
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-63570>
- *IBM BladeCenter Products and Technology*, SG24-7523
<http://www.redbooks.ibm.com/abstracts/sg247523.html>
- *IBM BladeCenter Interoperability Guide*
<http://www.redbooks.ibm.com/big>
- *IBM BladeCenter Power Guide*
<http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4401>
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IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules

IBM Redbooks Product Guide

As business applications become more and more demanding, data centers have become more complex, cumbersome, and expensive to manage. IBM BladeCenter offers solutions to help lower costs while enhancing performance by accommodating many integration technologies.

The IBM BladeCenter Layer 2/3 Switch offers all the switching features in a BladeCenter chassis at a competitive price. This switch is offered in two versions: Copper and Fiber. These versions provide reliability and flexibility and meet all the stringent requirements of both enterprise and telecom environments. Figure 1 shows the two switch modules.



Figure 1. IBM BladeCenter Layer 2/3 Copper (left) and Fiber (right) Gigabit Ethernet Switch Modules

Did you know?

Clients do not need the most expensive switches to manage their virtualization requirements. These low cost switches offer the maximum uplink bandwidth and a low blocking ratio for maximum performance, while consuming extremely lower power at only 27W. The fiber model is ideal for those who need to carry data greater distances, want better security since it is difficult to tap and does not radiate data, or look for better reliability because it is immune to electromagnetic interference.

Part number information

Table 1 shows the part numbers to order these modules.

Table 1. Part number and feature code for ordering

Description	Part number	Feature codes*
IBM BladeCenter Layer 2/3 Copper Gigabit Ethernet Switch Module	32R1860	1495 / 3212 / 3212
IBM BladeCenter Layer 2/3 Fiber Gigabit Ethernet Switch Module	32R1861	1496 / 3213 / 3213

* Feature codes are listed in the form of three codes separated by a forward slash mark (/). The first feature code is for BladeCenter E-, T-, H-, and HT-based configurations that are available through the IBM System x server. The second feature code is for BladeCenter S-based configurations that are available through the System x sales channel. The third feature code is for BladeCenter S- and BladeCenter H-based configurations that are available through the IBM Power Systems sales channel when applicable.

The part numbers include the following items:

- One IBM BladeCenter Layer 2/3 Copper Gigabit Ethernet Switch Module or IBM BladeCenter Layer 2/3 Fiber Gigabit Ethernet Switch Module with six small form-factor pluggable (SFP) transceivers
- 3-meter Universal Serial Bus (USB)-to-DB9 serial console cable
- Printed documentation
- Documentation CD-ROM

Benefits

The IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules offer the following benefits:

- **Integration and consolidation:** These switches offer integration within the BladeCenter chassis, enabling clients to consolidate full Layer 2-3 LAN switching and routing capabilities into a single chassis. This consolidation helps flatten the data center infrastructure and reduces the number of discrete devices, management consoles, and equipment that administrators must deal with, helping to lower costs and simplify deployment.
- **Layer 3 functionality:** The switches are two of only a few switch modules in the blade market that include Layer 3 functionality standard, which provides security and performance benefits as inter-VLAN traffic stays within the chassis. These switches also provide the full range of industry-standard Layer 3 protocols from static routes for small and medium business (SMB) customers to technologies, such as Open Shortest Path First (OSPF) and Border Gateway Protocol (BGP).
- **Fiber offering:** The fiber switch module is ideal for those clients who require fiber for high data rate systems that demand high bandwidth over long distances and require complete immunity to electrical interference.
- **Interoperability:** These switches interoperate seamlessly with the upstream switches of other vendors.
- **Management:** These switches are designed to support industry based CLI (Cisco-like) for those who are familiar with IOS, and a full-function Web-based GUI for the latest in simplicity.
- **Fault tolerance:** These switches automatically learn alternate routes and perform faster convergence in the unlikely case of a link, switch, or power failure. The switch uses proven technologies such as L2 trunk failover, advanced VLAN-based failover, Virtual Router Redundancy Protocol (VRRP), IGMP V3 snooping, and OSPF.

Features and specifications

The IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules for standard mode of operation includes the following features and functions:

- Internal ports
 - 14 internal full-duplex Gigabit ports, one connected to each of the blade servers in the BladeCenter unit
 - Two internal full-duplex 10/100 Mbps ports connected to the management module
- External ports
 - Copper switch: Six 1000BASE-T copper RJ-45 connections for making 10/100/1000 Mbps connections
 - Fiber switch: Six 1000BASE-SX SFP transceiver-based LC fiber connections for making 1000 Mbps connections
 - An RS-232 serial port that provides an additional means to install software and configure the switch module
- Scalability and performance
 - Autosensing 10/1000/1000 Mbps external Ethernet ports for bandwidth optimization
 - Non-blocking architecture with wire-speed forwarding of traffic

- Media access control (MAC) address learning: automatic update, supports up to 16 K MAC addresses
- Up to 128 IP interfaces per switch
- Static, EtherChannel, and LACP (IEEE 802.3ad) link aggregation, up to 6 Gb of total bandwidth per switch, up to three trunk groups, and up to six ports per group
- Support for jumbo frames (up to 9216 bytes)
- Broadcast/multicast storm control
- IGMP snooping for limit flooding of IP multicast traffic (IGMP V1, V2, and V3)
- IGMP filtering to control multicast traffic for hosts participating in multicast groups (IGMP V1, V2, and V3)
- Configurable traffic distribution schemes over trunk links based on source/destination IP addresses, MAC addresses, or both
- Fast port forwarding and fast uplink convergence for rapid STP convergence
- Availability and redundancy
 - VRRP for Layer 3 router redundancy
 - IEEE 802.1D STP for providing Layer 2 redundancy with PVRST+
 - IEEE 802.1s Multiple STP (MSTP) for topology optimization, up to 128 STP instances are supported by single switch
 - IEEE 802.1w Rapid STP (RSTP) provides rapid STP convergence for critical delay-sensitive, traffic-like voice or video
 - Layer 2 Trunk Failover to support active/standby configurations of network adapter teaming on blades
 - Interchassis redundancy (Layer 2 and Layer 3)
- VLAN support
 - Up to 1024 VLANs supported per switch; VLAN numbers ranging from 1 to 4095 (4095 is used for the management module's connection only)
 - 802.1Q VLAN tagging support on all ports
 - Private VLANs
- Security
 - VLAN-based, MAC-based, and IP-based access control lists (ACLs)
 - 802.1X port-based authentication
 - Multiple user IDs and passwords
 - User access control
 - Radius/TACACS+
- Quality of Service (QoS)
 - Up to eight queues per port
 - Support for IEEE 802.1p, IP ToS/DSCP, and ACL-based (MAC/IP source and destination addresses, VLANs) traffic classification and processing
 - Traffic shaping and re-marking based on defined policies
 - Eight Weighted Round Robin (WRR) priority queues per port for processing qualified traffic
- Layer 3 functions
 - IP forwarding

- IP filtering with ACLs (up to 4096 ACLs supported)
- VRRP for router redundancy
- Support for up to 128 static routes
- Routing protocol support (Router Information Protocol (RIP) v1, RIP v2, OSPF v1, v2, and v3, BGP-4), up to 1024 entries in routing table
- Support for DHCP Relay
- Manageability
 - Simple Network Management Protocol (SNMP; V1, V2, and V3)
 - HTTP/HTTPS browser GUI
 - Industry standard CLI and BLADEOS/AlteonOS CLI
 - Telnet interface for CLI
 - SSH
 - Serial interface for CLI
 - Scriptable CLI
 - Firmware image update (TFTP and FTP)
 - Network Time Protocol (NTP) for switch clock synchronization
 - IBM System Networking Element Manager support
- Monitoring
 - Switch LEDs for external port status and switch module status indication
 - Port mirroring for analyzing network traffic passing through switch
 - Change tracking and remote logging with syslog feature
 - POST diagnostics
- Serial over LAN (SOL)

The switch module supports the following IEEE standards:

- IEEE 802.1D STP with PVRST+
- IEEE 802.1s MSTP
- IEEE 802.1w RSTP
- IEEE 802.1p Tagged Packets
- IEEE 802.1Q Tagged VLAN (frame tagging on all ports when VLANs are enabled)
- IEEE 802.1x port-based authentication
- IEEE 802.2 Logical Link Control
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.3x Full-duplex Flow Control
- For the copper switch module:
 - IEEE 802.3 10BASE-T Ethernet
 - IEEE 802.3u 100BASE-TX Fast Ethernet
 - IEEE 802.3ab 1000BASE-T Gigabit Ethernet
 - IEEE 802.3z 1000BASE-X Gigabit Ethernet
- For the fiber switch module:
 - IEEE 802.3z 1000BASE-X Gigabit Ethernet
 - 1000BASE-SX Gigabit Ethernet

Supported BladeCenter chassis and expansion cards

The IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules are supported in the IBM BladeCenter chassis listed in the following table.

Table 2. IBM BladeCenter chassis that support the IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules

I/O module	Part number	BladeCenter S	BladeCenter E	BladeCenter H	BladeCenter T	BladeCenter HT	MSIM	MSIM-HT
IBM BladeCenter Layer 2/3 Copper Gigabit Ethernet Switch Module	32R1860	Y	Y	Y	Y	Y	Y	Y
IBM BladeCenter Layer 2/3 Fiber Gigabit Ethernet Switch Module	32R1861	Y	Y	Y	Y	Y	Y	N

The IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules support the expansion cards listed in the following table.

Table 3. Supported expansion cards

Description	Part number	Feature code	Supported by the 1/10Gb Uplink Ethernet Switch Module
Gigabit Ethernet			
Gigabit Ethernet integrated on the server system board	None	None	Supported
Ethernet Expansion Card (CFFv)	39Y9310	2969	Supported
Ethernet Expansion Card (CIOv)	44W4475	1039	Supported
2/4 Port Ethernet Expansion Card (CFFh)	44W4479	5476	Supported
QLogic Ethernet and 8 Gb Fibre Channel Expansion Card	44X1940	5485	Supported
10 Gigabit Ethernet			
Broadcom 10 Gb Gen 2 4-port Ethernet Expansion Card	46M6164	0098	No
Broadcom 10 Gb Gen 2 2-port Ethernet Expansion Card	46M6168	0099	No
Broadcom 2-port 10Gb Virtual Fabric Adapter	81Y3133	A1QR	No
Brocade 2-port 10GbE Converged Network Adapter	81Y1650	5437	No
Emulex 10GbE Virtual Fabric Adapter	49Y4235	5755	No
Emulex 10GbE Virtual Fabric Adapter Advanced	49Y4275	2435	No
Emulex Virtual Fabric Adapter II (CFFh)	90Y3550	A1XG	No
Emulex Virtual Fabric Adapter Advanced II (CFFh)	90Y3566	A1XH	No
Emulex 10GbE VFA II for IBM BladeCenter HS23	81Y3120	A287	No
Emulex 10GbE VFA Advanced II for IBM BladeCenter HS23	90Y9332	A2ZN	No
Intel 2-port 10 Gb Ethernet Expansion Card (CFFh)	42C1810	3593	No
Mellanox 10 Gb Ethernet Expansion Card (CFFh)	90Y3570	A1NW	No
QLogic 2-port 10Gb Converged Network Adapter (CFFh)	42C1830	3592	No

The five BladeCenter chassis have the following bays:

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

The IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules fit in a standard I/O bay (bays 1-4). The IBM BladeCenter Layer 2/3 Copper Ethernet Switch Module, with the addition of the Multi-Switch Interconnect Module (MSIM) in the BladeCenter H and HT chassis, can also fit in a high-speed I/O bay (bays 7-10). The IBM BladeCenter Layer 2/3 Fiber Gigabit Ethernet Switch Module is supported in the BladeCenter H chassis with MSIM (bays 7-10) but is not supported with MSIM-HT in the high-speed bays of the BladeCenter HT chassis. Supported bays are listed in the following table.

Table 4. IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules and BladeCenter chassis I/O bays support

Description	Part number	Bay 1 (Standard)	Bay 2 (Standard)	Bay 3 (Standard)	Bay 4 (Standard)	Bay 5 (Bridge)	Bay 6 (Bridge)	Bay 7 (High-speed)	Bay 8 (High-speed)	Bay 9 (High-speed)	Bay 10 (High-speed)
Gigabit Ethernet integrated on the server system board	None	Y	Y	N	N	N	N	N	N	N	N
Ethernet Expansion Card (CFFv)	39Y9310	N	N	Y	Y	N	N	N	N	N	N
Ethernet Expansion Card (CIOv)	44W4475	N	N	Y	Y	N	N	N	N	N	N
QLogic Ethernet and 4 Gb FC Card (CFFh)	39Y9306	N	N	N	N	N	N	Y	N	Y	N
2/4 Port Ethernet Expansion Card (CFFh)	44W4479	N	Y*	N	N	N	N	Y	Y	Y	Y
QLogic Ethernet and 8 Gb FC Card (CFFh)	44X1940	N	N	N	N	N	N	Y	N	Y	N

* The 2/4 Port Ethernet Expansion Card supports I/O bay 2 connections only when installed into a blade server that is installed in the BladeCenter S chassis.

Popular configurations

The IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules can be used in various configurations.

Basic two-port configuration

Figure 2 shows a basic use of the switch to route the two-port Ethernet controller that is integrated onto the blade server. Two switches are installed in bay 1 and bay 2 of the BladeCenter chassis. The connections between the controller and the switch modules are internal to the chassis. No wiring is needed.

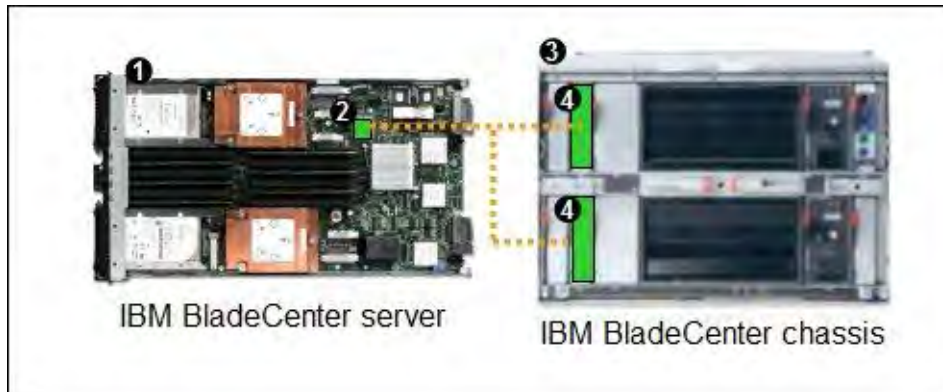


Figure 2. Using IBM BladeCenter Ethernet Switch Modules to route the integrated Ethernet ports

The following table lists the components that are used in this configuration.

Table 5. Components used in two-ports-per-server configuration

Diagram reference	Part number / machine type	Description	Quantity
1	Varies	IBM BladeCenter HS23 or other server	1 to 14
2	None	Ethernet controller on the system board of the server	1 per server
3	Varies	Any BladeCenter server (see Table 2)	1
4	32R1860 or 32R1861	IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Module	2

Four-port configuration

Figure 3 shows the use of switch to route four Ethernet ports from each server: the two integrated ports plus two ports supplied by a compatible CFFv or CIOv expansion card. Four Ethernet Switch Modules are installed in bay 1, bay 2, bay 3, and bay 4 of the BladeCenter chassis. All connections between the controller, card, and the switch modules are internal to the chassis. No wiring is needed.

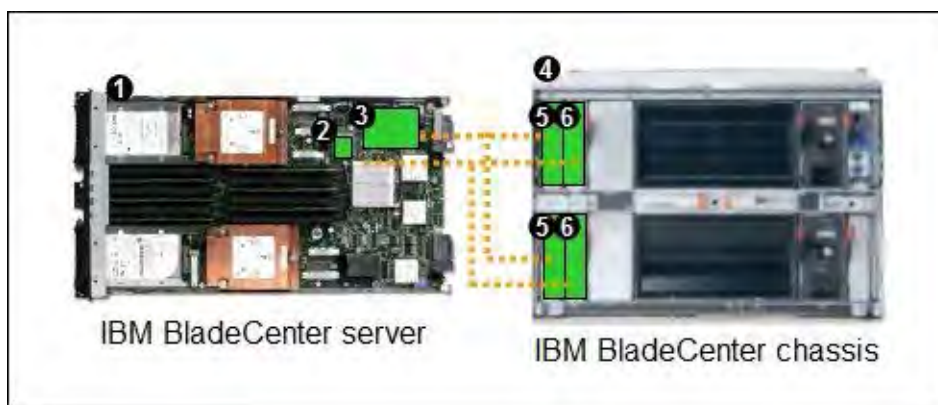


Figure 3. Using IBM BladeCenter Ethernet Switch Modules to route the four Ethernet ports from the integrated controller and a CFFv or CIOv expansion card

The following table lists the components that are used in this configuration.

Table 6. Components used in the four ports-per-server configuration

Diagram reference	Part number / machine type	Description	Quantity
1	Varies	IBM BladeCenter HS23 or other supported server	1 to 14
2	None	Ethernet controller on the system board of the server	1 per server
3	Varies	Compatible CFFv or CIOv expansion card (see Table 3)	1 per server
4	Varies	Any BladeCenter chassis (See Table 2)*	1
5	32R1860 or 32R1861	IBM BladeCenter Ethernet Switch Modules routing signals from the CFFv or CIOv card 3	2
6	32R1860 or 32R1861	IBM BladeCenter Ethernet Switch Modules routing signals from the integrated controller 2	2

* The expansion card can be installed in servers in the BladeCenter S (8886). However, by doing so, you lose the ability to connect to the BladeCenter S Disk Storage Modules (DSMs). The Ethernet expansion card goes in the place of the SAS expansion card that is needed to connect to the DSMs. Instead, use the 2/4 Port Ethernet Expansion Card (CFFh), part number 44W4479.

Maximum configuration: Eight Ethernet ports per server

Since BladeCenter servers support both a CFFh expansion card, plus either a CFFv or CIOv card (depending on the model of the server), you can install up to eight IBM BladeCenter Layer 2/3 Copper or Fiber Gigabit Ethernet Switch Modules in a BladeCenter H chassis and up to eight IBM BladeCenter Layer 2/3 Copper ESM in a BladeCenter HT. Figure 4 shows this 8-port solution. All connections between the cards and the switch modules are internal to the chassis. No wiring is needed.

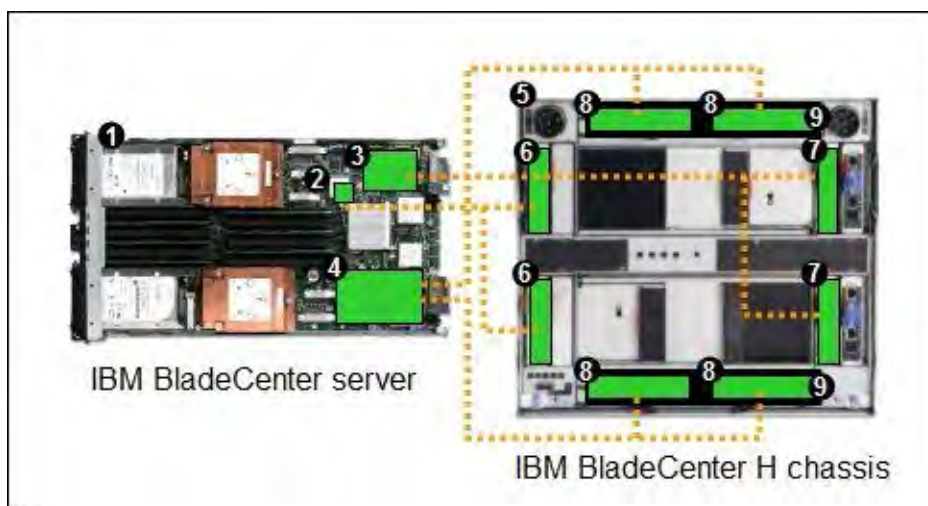


Figure 4. Using IBM BladeCenter Ethernet Switch Modules to route eight Ethernet ports per server

The following table lists the components that are used in this configuration.

Table 7. Components used in the eight-ports-per-server configuration

Diagram reference	Part number / machine type	Description	Quantity
1	Varies	IBM BladeCenter HS23 or other supported server	1 to 14
2	None	Ethernet controller on the system board of the server	1 per server
3	Varies	Compatible CFFv or CIOv expansion card (see Table 3)	1 per server
4	44W4479	2/4 Port Ethernet Expansion Card (CFFh)	1 per server
5	8852	BladeCenter H chassis	1
6	32R1860 or 32R1861	IBM BladeCenter Ethernet Switch Modules routing signals from the integrated controller 2	2
7	32R1860 or 32R1861	IBM BladeCenter Ethernet Switch Modules routing signals from the CFFv or CIOv card 3	2
8	32R1860 or 32R1861	IBM BladeCenter Ethernet Switch Modules routing signals from the CFFh card 4	4
9	39Y9314	Multi-switch Interconnect Module	2

Connectors and LEDs

Figure 5 shows the front panel of the IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules.

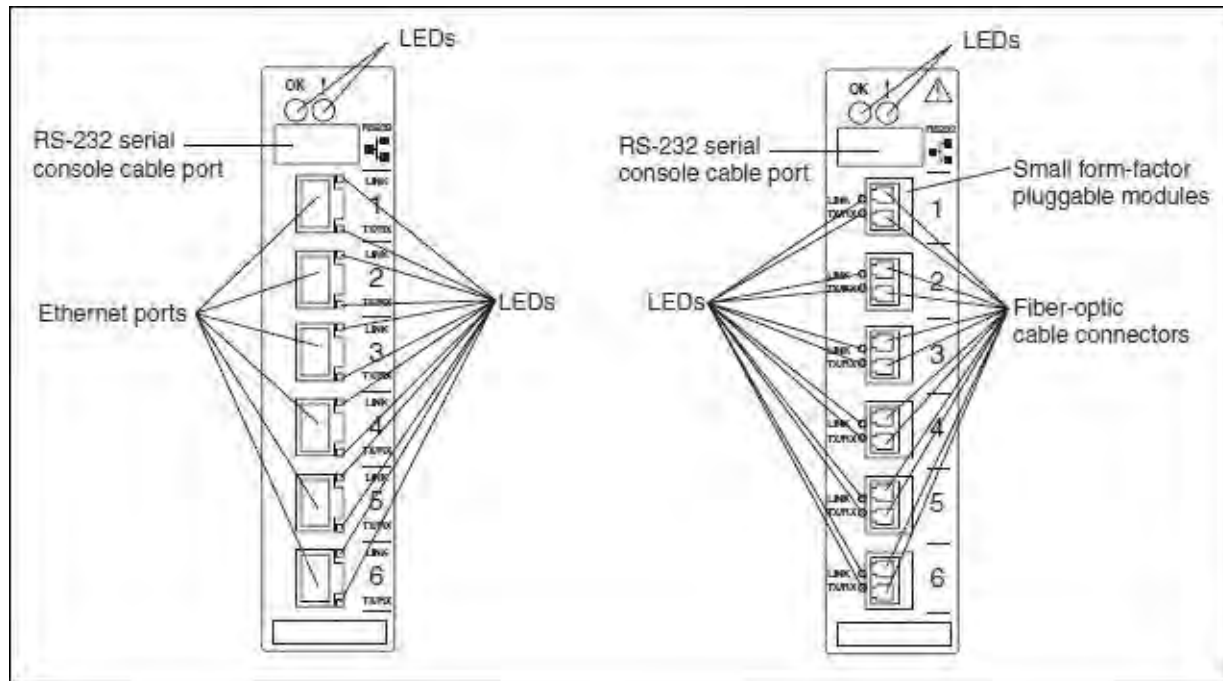


Figure 5. Front panel of the IBM BladeCenter Layer 2/3 Copper (left) and Fiber (right) Gigabit Ethernet Switch Modules

The front panel contain the following components:

- LEDs display the status of the switch module and the network: OK (indicating that the switch module has passed the power-on self-test (POST) with no critical faults and is operational) and switch module error (indicating that the switch module has failed the POST or detected an operational fault).
- One USB RS-232 console port provides an additional means to install software and configure the switch module. This USB-style connector enables connection of a special serial cable that is supplied with the switch module.
- The copper model of the switch module has six external 1000BASE-T Ethernet ports for 10/100/1000 Mbps connections to external Ethernet devices.
- The fiber model of the switch module has six external 1000BASE SX SFP transceiver ports for 1000 Mbps connections to external Ethernet devices.
- Each external port on the switch module contains an Ethernet link OK LED and an Ethernet Tx/Rx LED.

Network cabling requirements

The following network cable is required for the fiber switch module:

- 1000BASE-SX: 850 Nm wavelength, multimode fiber, 50 μ or 62.5 μ (550 meters maximum), with LC duplex connector

Note: Fiber connections use SFP transceivers that provide 1000BASE-SX (850 nm wavelength)

communications over multimode fiber cables (50μ or 62.5μ) for distances of up to 550 meters. 1000BASE-LX is not supported.

The following network cables are required for the copper switch module:

- 10BASE-T:
 - UTP Category 3, 4, 5 (100 meters (328 feet) maximum)
 - 100-ohm STP (100 meters maximum)
- 100BASE-TX:
 - UTP Category 5 (100 meters maximum)
 - EIA/TIA-568 100-ohm STP (100 meters maximum)
- 1000BASE-T:
 - UTP Category 6
 - UTP Category 5e (100 meters maximum)
 - UTP Category 5 (100 meters maximum)
 - EIA/TIA-568B 100-ohm STP (100 meters maximum)

Related publications

For more information, see the following documents:

- IBM Redbooks publication *Nortel Networks L2/3 Ethernet Switch Module* , REDP-3586
<http://www.redbooks.ibm.com/abstracts/redp3586.html>
- Nortel Networks Layer 2-3 GbE Switch Module Installation Guide
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-58334>
- OFM with Nortel/IBM Extensions User's Guide for Nortel L2-3 GbESM
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5074970>
- Alteon OS Application Guide
http://www.bladenetwork.net/userfiles/file/PDFs/IBM_GbE_L2-3_Applicat_Guide.pdf
- Alteon OS Command Reference
http://www.bladenetwork.net/userfiles/file/PDFs/IBM_GbE_L2-3_Command_Ref.pdf
- Alteon OS Release Notes
http://www.bladenetwork.net/userfiles/file/PDFs/IBM_GbE_L2-3_Release_Notes.pdf
- Alteon OS Browser-Based Interface (BBI) Quick Guide
http://www.bladenetwork.net/userfiles/file/PDFs/IBM_GbE_L2-3_BBI_QuickGuide.pdf
- Alteon OS ISCLI Reference
http://www.bladenetwork.net/userfiles/file/PDFs/IBM_GbE_L2-3_ISCLI_Ref.pdf
- Switch interoperability certifications by The Tolly Group
<http://www.thetollygroupinc.com/TVDetail.aspx?ProductID=296>
- IBM US Announcement Letter
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS105-011>
- *IBM BladeCenter Interoperability Guide*
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5073016>
- IBM Redbooks publication *IBM BladeCenter Products and Technology*, SG24-7523
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IBM BladeCenter features expand network communications options

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Overview

New network communication features are available on the IBM® BladeCenter® H chassis and the IBM BladeCenter JS12, JS22, and JS23/JS43 blade servers:

BladeCenter H:

- Voltaire QDR 4X Infiniband Switch
- BNT 10-port 10Gb Ethernet Switch Module
- QDR Infiniband Cable
- 10Gb Ethernet Pass-Thru Module
- Brocade 10-port 8 Gb SAN Switch
- Brocade 20-port 8 Gb SAN Switch
- Brocade 8 Gb SFP+ Transceiver

IBM BladeCenter JS12, JS22, and JS23/JS43:

- QLogic 2-port 10 Gb Converged Network Adapter (CFFh)

Also announcing are:

- Changes to the IBM i Edition for BladeCenter S (#0775)
- A new IBM i Edition for BladeCenter S with RAID (#0776)

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: YE001).

Planned availability date

October 30, 2009

Changes to the IBM i Edition for BladeCenter S (#0775)

The SAS RAID Controller Switch Module (#3734) is not orderable with the IBM i Edition for BladeCenter S (#0775).

New IBM i Edition for BladeCenter S with RAID (#0776)

When you order the IBM i Edition for BladeCenter S with RAID, you must order the minimum configuration to be eligible to order feature 0776. This offering is available only as initial order.

The minimum configuration for the IBM i Edition for BladeCenter S with RAID must include a BladeCenter S chassis (7779-BCS) with:

- One UltraSlim Enhanced SATA DVD-RAM Drive (#4154)
- One IBM BladeCenter S 6-Disk Storage Module (#4545)
- Two SAS RAID Controller Switch Modules (#3734)
- One Intelligent Copper Pass-thru Module (#5452)
- Three 146 GB 15K rpm SAS Disk Drives (#3749)
- Two Power Cords (2.5 m), to Wall, (120V/15A) (#4578)

Note: Features 4154, 4545, and 3734 cannot be removed. Feature 5452 can be removed if features 1590, 3174, 3212, or 3220 are ordered. Three of feature 3749 can be removed if larger capacity drives are ordered (3 x #3762, or 3 x #3747). Two of feature 4578 is a default that can be changed. The minimum configuration for the IBM i Edition for BladeCenter S with RAID must include an IBM BladeCenter JS12 Express (7998-60X) with:

- One IBM BladeCenter JS12, 2-core, 3.8 GHz Processor (#8442)
- Two Processor Entitlements (#8444)
- 4 GB (2 x 2 GB) DDR2 667 MHz DIMMs (#8229)
- One SAS Expansion Card (CFFv) for IBM BladeCenter (#8250)
- Two PowerVM™ Standard Edition (#5406)
- One primary operating system IBM i (#2145)

Note: Features 8442, 8250, 5406, and 2145 cannot be removed. Feature 8229 can be removed if larger memory DIMMs (#8239 or #8245) are ordered. One feature 8444 can be removed and replaced with feature 8443 if the order meets the requirements of an Express Product Offering. Other options can also be added to the IBM i Edition for BladeCenter S with RAID configuration. In addition, one IBM i processor entitlement with one-year Software Maintenance and a minimum of 10 user entitlements are required. PowerVM Standard Edition is included with the BladeCenter JS12 at no additional charge. This edition delivers PowerVM virtualization technology, including Micro-Partitioning™, Virtual I/O Server with Integrated Virtualization Manager (IVM), Lx86, and Virtual LAN features.

Brocade 10-port 8 Gb SAN Switch

The Brocade 10-port 8 Gb SAN Switch Module for BladeCenter:

- Supports I/O module slots 3 and 4 of the IBM BladeCenter
- Delivers two internal 100 Mbps Ethernet links for switch setup and management
- Is supported with QLogic 2 Gb and 4 Gb FC expansion cards (host bus adapters)
- Is supported with IBM TotalStorage® DS4000™, DS6000™, and DS8000™ devices
- Is fully compatible (backward and forward) with the entire family of SilkWorm (TotalStorage b-type) switches and directors

- Has function equivalent to Brocade SilkWorm 200e
- Includes standard FabricOS, advanced zoning, and Web tools
- Supports optional features such as Advanced Security, Performance Bundle, and Fabric Manager V5.x
- Has three 8 Gb uplinks on the 20-port switch module
- Includes seven internal fabric ports on the 20-port switch module
- Offers switch management through CLI via Telnet and Web tools
- Offers real-time health monitoring through optional Fabric Watch
- Supports SNMP-manageable interfaces (two internal 100 Mbps Ethernet links)
- Is comparable with IBM TotalStorage b-type SAN Switch Family

Brocade 20-port 8 Gb SAN Switch

The Brocade 20-port 8 Gb SAN Switch Module for BladeCenter:

- Supports I/O module slots 3 and 4 of the IBM BladeCenter
- Delivers two internal 100 Mbps Ethernet links for switch setup and management
- Is supported with QLogic 2 Gb and 4 Gb FC expansion cards (host bus adapters)
- Is supported with IBM TotalStorage DS4000, DS6000, and DS8000 devices
- Is fully compatible (backward and forward) with the entire family of SilkWorm (TotalStorage b-type) switches and directors
- Has function equivalent to Brocade SilkWorm 200e
- Includes standard FabricOS, advanced zoning, and Web tools
- Supports optional features such as Advanced Security, Performance Bundle, and Fabric Manager V5.x
- Has six 8 Gb uplinks on the 20-port switch module
- Includes 14 internal fabric ports on the 20-port switch module
- Offers switch management through CLI via Telnet and Web tools
- Offers real-time health monitoring through optional Fabric Watch
- Supports SNMP-manageable interfaces (two internal 100 Mbps Ethernet links)
- Is comparable with IBM TotalStorage b-type SAN Switch Family

Brocade 8 Gb SFP+ Transceiver

The Brocade 8 Gb SFP+ Short-wave Optic Transceiver for IBM BladeCenter is for use with Brocade 8 Gb 10-port SAN Switch Module (#5045) and Brocade 8 Gb 20-port SAN Switch Module (#5869).

Voltaire QDR 4X Infiniband Switch

The 40 Gb Switch Module offers scalability in LAN switch complexity while maintaining ease of management. This switch module enables administrators to provide full layer 2/3 10 Gb LAN switching and routing capabilities to each server within a BladeCenter chassis. The Infiniband Switch Module offers fourteen 40 Gb ports to each server and sixteen ports out of the chassis per switch.

The Voltaire 40 Gb Infiniband Switch Module:

- Offers an end-to-end solution at up to 40 Gb
- Provides a PCI Express x8 host interface for high-speed connection
- Offers connectivity to high-speed I/O module bays in the BCH chassis
- Enables use of up to two 40 Gb ports from the blade server to the external network
- Has a 2-port card that allows use of two 40 Gb High-Speed Switch Modules (HSSM) in a chassis

BNT 10-port 10 Gb Ethernet Switch Module

The BNT 10-port 10 Gb Ethernet Switch Module is a high-speed addition to the BladeCenter switch portfolio. It offers scalability in LAN switch complexity while maintaining ease of management.

The BNT 10-port 10 Gb Ethernet Switch Module for IBM BladeCenter is a new switch option designed for the next-generation IBM BladeCenter chassis that enables administrators to provide full Layer 2/3 10 Gb LAN switching and routing capabilities to each server within a BladeCenter chassis. Such consolidation flattens the topology of the data center infrastructure through convergence of storage and data networks, thus helping reduce the number of discrete devices, management consoles, and different management systems.

The BNT 10 Gb Switch Module is a full-fabric Ethernet switch and is available in a 10-port active configuration. It supports high-performance up to 10 Gb per second Ethernet data processing solutions across the LAN.

The BNT 10-port 10 Gb Ethernet Switch Module includes the following features and functions:

- Form-factor
 - Single-wide high-speed switch module
- Internal ports
 - 14 internal auto-negotiating ports: 1 Gb or 10 Gb to the server blades
 - Two internal full-duplex 100 Mbps ports connected to the management module
- External ports
 - Up to ten 10 Gb SFP+ ports (also designed to support 1 Gb SFP if required, flexibility of mixing 1 Gb/10 Gb)
 - One 10/100/1000 Mb copper RJ-45 used for management or data
 - An RS-232 mini-USB connector for serial port that provides an additional means to install software and configure the switch module
- Scalability and performance
 - Autosensing 1 Gb/10 Gb internal and external Ethernet ports for bandwidth optimization
 - Nonblocking architecture with wire-speed forwarding of traffic and full line rate performance of 480 Gbps full duplex
 - Media access control (MAC) address learning: automatic update, supports up to 32 Kb MAC addresses
 - Up to 128 IP interfaces per switch
 - Static, EtherChannel, and LACP (IEEE 802.3ad) link aggregation, up to 100 Gb of total bandwidth per switch, up to 18 trunk groups, and up to eight ports per group
 - Support for jumbo frames (up to 12288 bytes)
 - Broadcast/multicast storm control
 - IGMP snooping for limit flooding of IP multicast traffic (IGMP V1, V2, and V3)
 - Configurable traffic distribution schemes over trunk links based on source/destination IP addresses, MAC addresses, or both
 - Fast port forwarding and fast uplink convergence for rapid STP convergence
- Availability and redundancy
 - VRRP for Layer 3 router redundancy
 - IEEE 802.1D STP for providing Layer 2 redundancy with PVRST+
 - IEEE 802.1s Multiple STP (MSTP) for topology optimization, up to 128 STP instances are supported by single switch
 - IEEE 802.1w Rapid STP (RSTP) provides rapid STP convergence for critical delay-sensitive, traffic-like voice or video

- Layer 2 Trunk Failover to support active/standby configurations of network adapter teaming on blades
- Interchassis redundancy (Layer 2 and Layer 3)
- VLAN support
 - Up to 1024 VLANs supported per switch; VLAN numbers ranging from 1 to 4095 (4095 is used for the management module's connection only)
 - 802.1Q VLAN tagging support on all ports
 - Protocol-based VLANs
- Security
 - VLAN-based, MAC-based, and IP-based access control lists (ACLs)
 - 802.1X port-based authentication
 - Multiple user IDs and passwords
 - User access control
 - Radius, TACACS+, and LDAP
- Quality of Service (QoS)
 - Up to eight queues per port
 - Support for IEEE 802.1p, IP ToS/DSCP, and ACL-based (MAC/IP source and destination addresses, VLANs) traffic classification and processing
 - Traffic shaping and remarking based on defined policies
 - Eight Weighted Round Robin (WRR) priority queues per port for processing qualified traffic
- Layer 3 functions
 - IP forwarding
 - IP filtering with ACLs (up to 4096 ACLs supported)
 - VRRP for router redundancy
 - Support for up to 128 static routes
 - Routing protocol support (Router Information Protocol (RIP) V1, RIP V2, OSPF V1, V2, and V3, BGP-4), up to 1,024 entries in routing table
 - Support for DHCP Relay
 - IPv6 management (full IPv6 support, including routing, is planned to be released in optional version of firmware in 2009)
- Manageability
 - Simple Network Management Protocol (SNMP V1, V2, and V3)
 - HTTP/HTTPS browser GUI
 - Industry standard CLI and BLADEOS/AlteonOS CLI
 - Telnet interface for CLI
 - SSH v1/v2
 - Serial interface for CLI
 - Scriptable CLI
 - Firmware image update (TFTP and FTP)
 - Network Time Protocol (NTP) for switch clock synchronization
 - BNT BLADEHarmony Manager support
- Monitoring
 - Switch LEDs for external port status and switch module status indication
 - Port mirroring for analyzing network traffic passing through switch
 - Change tracking and remote logging with syslog feature
 - POST diagnostics
- Special functions
 - Serial over LAN (SOL)

10 Gb Ethernet Pass-Thru Module

The 10 Gb Ethernet Pass-Thru Module for IBM BladeCenter is ideal for clients looking to enable end-to-end nonblocking 10 Gb setup within the chassis. This device supports both Ethernet and Converged Enhanced Ethernet (CEE) packets, which allows clients to connect a BladeCenter chassis to an FCoE-capable top-of-rack switch.

The fourteen 10 Gb Uplink ports are based on optical SFP+ technology to offer the highest performance while maintaining industry standard connectivity. This offering will also work with BladeCenter Open Fabric Manager, providing all the benefits of I/O Virtualization at 10 Gb speeds.

Clients can use this module along with the 2-port 10 Gb Converged Network Adapter (CNA) and connect to a converged top-of-rack switch such as the Brocade 8000 or Nexus 5K. This setup allows clients to reduce hardware, as well as power and cooling costs, while boosting performance by operating at 10 Gb bandwidth.

Features and specifications

The 10 Gb Ethernet Pass-Thru Module includes the following features and functions:

- Single-wide high-speed switch module
- Fourteen internal 10 Gb ports to the server blades (no auto-negotiation)
- Up to fourteen 10 Gb SFP+ uplink ports (SFP+ modules are not included)
- Support for SR, LR, and DAC copper cables
- Direct one-to-one mappings of external and internal ports (no configuration required)
- Simple setup and monitoring through advanced management module
- Management-module inter-integrated Circuit (I2C) interface that provides vital product data (VPD) and register access
- Self-test and diagnostics capability
- No Serial over LAN (SOL) support

QLogic 2-port 10 Gb Converged Network Adapter (CFFh)

The QLogic 2-port 10 Gb Converged Network Adapter (CFFh) for IBM BladeCenter offers robust 8 Gb Fibre Channel storage connectivity and 10 Gb networking over a single Converged Enhanced Ethernet (CEE) link. Because this adapter combines the functions of a network interface card and a host bus adapter on a single converged adapter, clients can realize potential benefits in cost, power, and cooling, and data center footprint by deploying less hardware.

Features:

The expansion card has the following features:

- Combo Form Factor (CFFh) PCI Express 2.0 x8 adapter
- Communication module: QLogic ISP8112
- Support for up to two CEE HSSMs in a BladeCenter H or HT chassis
- Support for 10 Gb Converged Enhanced Ethernet (CEE)
- Support for Fibre Channel over Converged Enhanced Ethernet (FCoCEE)
- Full hardware offload for FCoCEE protocol processing
- Support for IPv4 and IPv6
- Support for SAN boot over CEE, PXE boot, and iSCSI boot
- Support for Wake on LAN®
- Support for BladeCenter Open Fabric Manager for BIOS, UEFI, and FCode

Stateless offload features include:

- IP, TCP, and UDP checksum offloads
- Large and Giant Send Offload (LSO, GSO)
- Receive Side Scaling (RSS)
- Header-data split
- Interrupt coalescing
- NetQueue

Note: VIOS attachment requires VIOS 2.1.2.0, or later.

DVD-RAM write capability

DVD-RAM write capability is now available with feature number 4154 with AIX®, VIOS, and IBM i (as a client or VIOS). This write capability includes support for the following AIX and VIOS commands in conjunction with DVD-RAM (DVD-R/W) media: mkcd, mkdvd, tar, and cpio. For IBM i, all DVD-RAM operations that are supported by IBM i are available. The following levels of AIX, VIOS, or IBM i are required in order to support this capability:

- AIX 5.3 with the 5300-11 Technology Level, or later
- AIX 6.1 with the 6100-04 Technology Level, or later
- VIOS 2.1.2.0, or later
- IBM i 6.1, or later via VIOS 2.1.2.0, or later

Note: VIOS attachment requires VIOS 2.1.2.0, or later.

QLogic 8 Gb Fibre Channel Expansion Card (Cffh)(#8271) now supported by AIX, VIOS, and IBM i

The following additional operating system levels now support the QLogic 8 Gb Fibre Channel Expansion Card (Cffh), feature number 8271:

- AIX 5L™ for POWER® Version 5.3 with the 5300-11 Technology Level
- AIX Version 6.1 with the 6100-04 Technology Level
- AIX 5L for POWER Version 5.3 with the 5300-08 Technology Level and Service Pack 8
- AIX 5L for POWER Version 5.3 with the 5300-09 Technology Level and Service Pack 5
- AIX 5L for POWER Version 5.3 with the 5300-10 Technology Level and Service Pack 2
- AIX Version 6.1 with the 6100-01 Technology Level and Service Pack 7
- AIX Version 6.1 with the 6100-02 Technology Level and Service Pack 6
- AIX Version 6.1 with the 6100-03 Technology Level and Service Pack 3
- IBM i 6.1, or later, via VIOS 2.1.2.0, or later

Port ID Virtualization: NPIV:

NPIV provides direct access to Fibre Channel adapters from multiple client partitions, simplifying the management of Fibre Channel SAN environments. NPIV support is included with PowerVM Express, Standard, and Enterprise Edition and supports AIX V5.3, AIX V6.1, IBM i 6.1.1 hosted by VIOS 2.1.2, and SUSE Linux® Enterprise Server 11 partitions on JS POWER blades with an 8 Gb Fibre Channel Host Bus Adapter (HBA). Supported 8 Gb Fibre Channel HBAs feature number are 8240, 8242, and 8271. The following levels of AIX and VIOS are required for NPIV on blades:

- AIX 5L for POWER Version 5.3 with the 5300-11 Technology Level, or later
- AIX Version 6.1 with the 6100-04 Technology Level, or later
- VIOS 2.1.2.0, or later

See table for interoperability.

N PIV Compatibility Matrix	AIX Client			IBM i Client		
	QLogic 8GB CIOv	QLogic 8GB CFFh	Emulex 8GB CIOv	QLogic 8GB CIOv	QLogic 8GB CFFh	Emulex 8GB CIOv
	Feature #8242	Feature #8271	Feature #8240	Feature #8242	Feature #8271	Feature #8240
	See Note 1	See Note 1		See Note 1	See Note 1	
QLogic 4GB Switch Modules Features Codes #3243,#3244 See Note 2	Yes	Yes	No	Yes, virtual Tape only	Yes, virtual Tape only	No
QLogic 8GB Switch Modules Feature Code #3284 See Note 3	Yes	Yes	No	Yes, virtual Tape only	Yes, virtual Tape only	No
Brocade 4GB Switch Modules Feature Codes #3206,#3207	No	No	No	No	No	No
Brocade 8GB Switch Modules Feature Codes #5045,#5869	Yes	Yes	Yes	Yes, virtual Tape only	Yes, virtual Tape only	Yes, virtual Tape only

N PIV Compatibility Matrix	Linux Client		
	QLogic 8GB CIOv	QLogic 8GB CFFh	Emulex 8GB CIOv
	Feature Code #8242	Feature Code #8271	Feature Code #8240
	See Note 1	See Note 1	
QLogic 4GB Switch Modules Features Codes #3243,#3244 See Note 2	Yes	Yes	No
QLogic 8GB Switch Modules Feature Code #3284 See Note 3	Yes	Yes	No
Brocade 4GB Switch Modules Feature	No	No	No

Codes
#3206, #3207

Brocade 8GB Switch Modules
Feature Codes
#5045, #5869

Note 1
Requires firmware version level 5.02.01, or later

Note 2
Requires firmware version level 6.5.0.22.00, or later

Note 3
Requires firmware version level 7.10.1.04, or later

Virtual Tape: PowerVM has two virtualization methods for using tape devices on IBM POWER6™ processor-based servers, simplifying backup and restore operations. Both methods are supported with PowerVM Express, Standard, or Enterprise Edition. NPIV enables PowerVM LPARs to access SAN tape libraries using shared physical HBA resources for AIX V5.3, AIX V6.1, IBM i 6.1.1 hosted by VIOS 2.1.2, and SUSE Linux Enterprise Server 11 partitions. Virtual tape support allows serial sharing of selected SAS tape devices for AIX V5.3, AIX V6.1, IBM i 6.1, or later, hosted by VIOS 2.1.1 or later, and SUSE Linux Enterprise Server 11 partitions.

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at:

http://www-03.ibm.com/able/product_accessibility/index.html

Section 508 of the U.S. Rehabilitation Act

IBM Power® System models are capable, when used in accordance with IBM's associated documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it.

Statement of general direction

IBM plans to enhance its support of QLogic 2-port 10Gb Converged Network Adapter CFFh (#8275) on the Linux and IBM AIX operating systems in first half 2010 by adding N_Port ID Virtualization (NPIV) capability through VIOS. IBM plans to enhance its support of QLogic 2-port 10Gb Converged Network Adapter CFFh (#8275) on the IBM i operating system in second half 2010 by adding Fibre Channel and N_Port ID Virtualization (NPIV) capability through VIOS.

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice. Any reliance on these statements of general direction is at the relying party's sole risk and will not create liability or obligation for IBM.

Product number

The following are newly announced features on the specific models of the IBM BladeCenter 7778, 7779, 7989, and 7998 machine type:

Description	Machine type	Model	Feature number
IBM i Edition Offering Indicator #2	7779	BCS	0776
voltaire 40 Gb Infiniband Switch Module for IBM	7998	60X	

BladeCenter	7989	BCH	3204
BNT 10-port 10 Gb Ethernet Switch Module for IBM BladeCenter	7989	BCH	3248
QDR InfiniBand 3M QSFP Cable	7989	BCH	3249
Brocade 10-port 8 Gb SAN Switch Module for IBM BladeCenter	7989	BCH	5045
Brocade 8 Gb SFP+ Short-wave Optic Transceiver	7989	BCH	5358
10 Gb Ethernet Pass-Thru Module	7989	BCH	5412
Brocade 20-port 8 Gb SAN Switch Module for IBM BladeCenter	7989	BCH	5869
QLogic 2-port 10Gb Converged Network Adapter CFFh	7778	23X	8275
	7998	60X	
		61X	

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=109-545>

Publications

No publications are shipped with the announced features.

Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

<http://www.ibm.com/services/>

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

<http://www.ibm.com/services/continuity>

For details on education offerings related to specific products, visit

<http://www.ibm.com/services/learning/index.html>

Select your country, and then select the product as the category.

Technical information

Planning information

Cable orders

No cable orders are required.

Security, auditability, and control

This product uses the security and auditability features of host software and application software.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

<http://www.ibm.com/support/electronic>

Prices

The following are newly announced features on the specific models of the IBM BladeCenter 7778, 7779, 7989, and 7998 machine type:

Description Machine Type 7778	Model number	Feature numbers	Purchase price	Minimum Initial/ Monthly Maint. Charge	Both/ Support	RP CSU	MES
QLogic 2-port 10Gb Converged Network Adapter	23X	8275		CFFh	Both	Yes	No

Description Machine Type 7779	Model number	Feature numbers	Purchase price	Minimum Initial/ Monthly Maint. Charge	Both/ Support	RP CSU	MES
IBM i Edition offering Indicator #2	BCS	0776	NC		Initial	N/A	No

Description Machine Type 7989	Model number	Feature numbers	Purchase price	Minimum Initial/ Monthly Maint. Charge	MES/ Both/ Support	RP CSU MES
Voltaire 40 Gb Infiniband Switch Module for IBM BladeCenter	BCH	3204			Both	Yes No
BNT 10-port 10 Gb Ethernet Switch Module for IBM BladeCenter	BCH	3248			Both	Yes No
QDR InfiniBand 3M QSFP Cable	BCH	3249			Both	Yes No
Brocade 10-port 8 Gb SAN Switch Module for IBM BladeCenter	BCH	5045			Both	Yes No
Brocade 8 Gb SFP+ Short-wave Optic Transceiver	BCH	5358			Both	Yes No
10 Gb Ethernet Pass-Thru Module	BCH	5412			Both	Yes No
Brocade 20-port 8 Gb SAN Switch Module for IBM BladeCenter	BCH	5869			Both	Yes No

Description Machine Type 7998	Model number	Feature numbers	Purchase price	Minimum Initial/ Monthly Maint. Charge	MES/ Both/ Support	RP CSU MES
IBM i Edition Offering Indicator #2	60X	0776	NC		Initial	N/A No
QLogic 2-port 10Gb Converged Network Adapter CFFh	60X	8275			Both	Yes No
	61X				Both	Yes No

Machine type	Model	Feature number	Description	System x equivalent	Price
7778	23X	8275	QLogic 2-port 10Gb Converged Network Adapter CFFh	42C1830	\$1,499
7989	BCH	3204	Voltaire 40 Gb Infiniband Switch Module for IBM BladeCenter	46M6005	11,999
7989	BCH	3248	BNT 10-port 10 Gb Ethernet Switch Module for IBM BladeCenter	46C7191	11,199
7989	BCH	3249	QDR InfiniBand 3M QSFP Cable	49Y9980	159
7989	BCH	5045	Brocade 10-port 8 Gb SAN Switch Module for IBM BladeCenter	44X1921	6,699
7989	BCH	5358	Brocade 8 Gb SFP + Short-wave Optic Transceiver	44X1962	329
7989	BCH	5412	10 Gb Ethernet	46M6181	4,999

7989	BCH	5869	Pass-Thru Module Brocade 20- port 8 Gb SAN Switch Module for IBM BladeCenter	44X1920	9,779
7998	60X	8275	QLogic 2- port 10Gb Converged Network Adapter CFFh	42C1830	1,499
7998	61X	8275	QLogic 2- port 10Gb Converged Network Adapter CFFh	42C1830	1,499
7779	BCS	0776	IBM i Edition for BladeCenter S with RAID	NA	NC
7998	60X	0776	i Edition Express Offering Indicator #2	NA	NC

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HS21 (8853) compatibility

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— Blade Chassis

Blade Chassis			
Product Type	Manufacturer	Part Number	Product Description (Click for Details)
Enclosure	IBM	7967(8853)	IBM BladeCenter
Enclosure	IBM	8677(8853)	IBM BladeCenter
Enclosure	IBM	8720(8853)	IBM BladeCenter T - DC
Enclosure	IBM	8730(8853)	IBM BladeCenter T - AC
Enclosure	IBM	8740(8853)	IBM BladeCenter HT - DC
Enclosure	IBM	8750(8853)	IBM BladeCenter HT - AC
Enclosure	IBM	8852(8853)	IBM BladeCenter H
Enclosure	IBM	8886/7779(8853)	IBM BladeCenter S

- + Server Applications and Middleware
- + Storage Controllers
- + Host Attach / Mainframe and ESCON Adapters
- + LAN Adapters
- + Switches
- + Rack Enclosures & Rack Tower Conversion Kits
- + Storage Devices
- + Expansion Units
- + System Upgrades

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8852, 7989 compatibility

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— Blade Chassis

Blade Chassis			
Product Type	Manufacturer	Part Number	Product Description (Click for Details)
Blade	IBM	0792(8852/7989)	IBM BladeCenter QS21 (All Models)
Blade	IBM	0793(8852/7989)	IBM BladeCenter QS22
Blade	IBM	7778(8852/7989)	POWER6 Blade JS23/JS43
Blade	IBM	7870/7809(8852/7989)	IBM BladeCenter HS22
Blade	IBM	7871(8852/7989)	IBM BladeCenter HS22V
Blade	IBM	7872(8852/7989)	IBM BladeCenter HX5
Blade	IBM	7873(8852/7989)	IBM BladeCenter HX5
Blade	IBM	7875(8852/7989)	IBM BladeCenter HS23
Blade	IBM	7875, E5-xxxxV2(8852/7989)	IBM BladeCenter HS23 (E5-xxxxV2)
Blade	IBM	7891(8852/7989)	IBM BladeCenter PS703/PS704
Blade	IBM	7901(8852/7989)	IBM BladeCenter LS22
Blade	IBM	7902(8852/7989)	IBM BladeCenter LS42
Blade	IBM	7971(8852/7989)	IBM BladeCenter LS21
Blade	IBM	7972(8852/7989)	IBM BladeCenter LS41
Blade	IBM	7981(8852/7989)	IBM BladeCenter HS20
Blade	IBM	7995(8852/7989)	IBM BladeCenter HS21 XM
Blade	IBM	7996(8852/7989)	IBM BladeCenter HC10
Blade	IBM	7998(8852/7989)	POWER6 Blade JS22
Blade	IBM	7998-60X(8852/7989)	POWER6 Blade JS12
Blade	IBM	8014(8852/7989)	IBM BladeCenter HS12
Blade	IBM	8028(8852/7989)	IBM BladeCenter HS12
Blade	IBM	8038(8852/7989)	IBM BladeCenter HS23E
Blade	IBM	8406(8852/7989)	IBM BladeCenter PS700/PS701/PS702
Blade	IBM	8832(8852/7989)	IBM BladeCenter HS20 (All Models)
Blade	IBM	8842(8852/7989)	IBM BladeCenter JS20 (All Models)
Blade	IBM	8843(8852/7989)	IBM BladeCenter HS20 (All Models)
Blade	IBM	8844/7988(8852/7989)	IBM BladeCenter JS21 (All Models)
Blade	IBM	8850(8852/7989)	AMD Opteron LS20 for IBM BladeCenter
Blade	IBM	8853(8852/7989)	IBM BladeCenter HS21

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