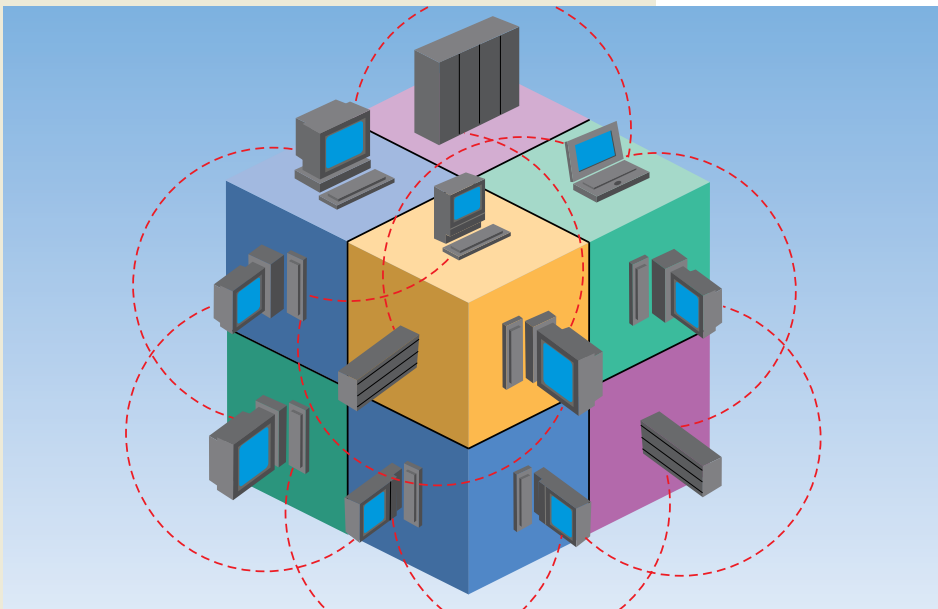


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Success with IBM  
System x and  
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# **IBM System x and BladeCenter Business Partner Guidebook**

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# IBM System x and BladeCenter Business Partner Guidebook

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Fourteenth Edition

*Your Roadmap to Success with IBM  
System x and BladeCenter*

Edited by Jim Hoskins

(version 14.0e)



MAXIMUM PRESS  
605 Silverthorn Road  
Gulf Breeze, FL 32561  
(850) 934-0819  
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Many people gave assistance in preparation of this guidebook. Some provided information concerning their product area of expertise. Others reviewed the manuscript and provided helpful comments. To all of those who assisted...THANK YOU!!

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# What's New in This Edition?

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This edition of the guidebook has been updated to include IBM System x and BladeCenter products announced through June 2009.

Here are some of the products that have been introduced or enhanced since the last edition:

## [Social Media Resources for IBM Business Partners](#)

[x3200 M2 update](#)

[x3400 M2 update](#)

[x3500 M2](#)

[x3250 M2 update](#)

[x3755 update](#)

[BladeCenter H update](#)

[HS12 update](#)

[LS22 update](#)

[LS42 update](#)

[JS12 update](#)

[JS23](#)

[JS43](#)

[BladeCenter I/O update](#)

# Your 9-Step Quick Start

---

Take these nine steps to “hit the ground running” as a new IBM Business Partner.

## 1. Check for Updated Editions of This eBook

This guidebook has the ability to check for more current editions which are released periodically. Simply click on the “More on the Web” link provided here (or the link on the cover) and this guidebook will automatically check to see if you have the most current edition. If you don’t, you will be able to download the latest edition immediately.

### MORE ON THE WEB

- [Check for updated editions of this guidebook](#)

## 2. Apply for Your IBM PartnerWorld Membership

The IBM PartnerWorld Website is your source for information for all things related to being an IBM Business Partner (e.g., Business Partner relationships, guidelines, support, product info, etc.). You will need a user

### MORE ON THE WEB

- [Explore PartnerWorld](#)
- [PartnerWorld contact phone numbers by country](#)
- [Get your PartnerWorld user ID](#)

ID and a password to gain access to some areas of the site. If you have any questions, call PartnerWorld for help (follow the link in the “More on the Web” box to get the right phone number for your country).

### 3. Plug in to IBM Product and Program Communications

Staying informed is one key to success. IBM has a special page on PartnerWorld that helps you do just that. Here you

#### MORE ON THE WEB

- [Get plugged in to IBM product and program communications](#)

will find new product announcements, letters to Business Partners, customer success stories, educational opportunities, and more.

### 4. Review the System x Express Advantage Portfolio

The IBM Express Advantage portfolio is a set of IBM products and services (e.g., servers, storage, printers, services, etc.) specially configured and priced for the small and mid-size business environment. Most System x and BladeCenter

#### MORE ON THE WEB

- [IBM Express Advantage portfolio](#)

products are now offered as Express models, which offer more aggressive pricing, faster availability, and ease of installation.

Become familiar with IBM Express Advantage and you will have solutions for your customers that you can deploy quickly and grow as needed.

## 5. Understand the Express Seller Program

Express Seller is designed to help IBM Business Partners accelerate sales of IBM products and services to small and mid-size businesses. IBM provides key offerings that meet your clients' business needs at competitive prices and provides extensive marketing support including "air cover" advertising and customizable materials to help you generate leads.

### MORE ON THE WEB

- [Express Seller Toolkit](#)

## 6. Learn to Quickly Find IBM Product Information

IBM maintains a search page that allows you to quickly find detailed product information from IBM announcement letters (one of these is released for every product IBM announces), the IBM Sales Manual (a comprehensive collection of detailed info on all IBM products), and much more. Give it a try so you will know how to find what you need when you need it.

### MORE ON THE WEB

- [Find detailed IBM product information quickly](#)

## 7. Learn to Find Competitive Information

IBM consistently updates information about the competitors you will encounter and their products. Explore this valuable tool so you will be ready when you need it. You will need your user ID and password.

### MORE ON THE WEB

- [Find competitive info](#)

## 8. Try Out “Know Your IBM”

IBM offers eligible Business Partners some “quick-learn training modules” under the name “Know Your IBM (KYI),” which can help you learn what you need to know about IBM offerings. You can earn points by completing these modules and redeem the points for merchandise at participating retailers. You can earn additional points for reporting sales through KYI.

KYI is more general training that will give you a “high-level” view of IBM offerings.

The roadmaps provided by IBM will guide you to more detailed training opportunities.

### MORE ON THE WEB

- [“Know Your IBM” training modules](#)

## 9. Make Your Training and Certification Plan

Knowledge is power. IBM offers many opportunities to learn and to demonstrate your knowledge through certification.

Now is a good time to make your plans.

### MORE ON THE WEB

- [Explore training and certification opportunities](#)



# Introduction

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## About This Guidebook

This MaxFacts™ interactive guidebook brings together—all in one place—the resources you need to be successful as an IBM System x Business Partner. It contains information gathered and adapted with permission from multiple IBM and non-IBM sources. Also, there are embedded links to more detailed information and news available on the Internet, so you always have the most current information at your fingertips. We are confident you will find this a useful reference tool.

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- Click on the “Table of Contents” links to go directly to that part of the guidebook
- Search for keywords in the document using the Acrobat Reader “Find” function (the binoculars icon on the toolbar).

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# 1

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## Welcome to the Team

In this chapter, we cover some basics about working with IBM.

### Why Team with IBM?

If you are seeking to truly differentiate yourself in the marketplace by extending your market reach with more profitable end-to-end solution offerings, IBM is uniquely positioned to help you make this happen. IBM provides you with an integrated portfolio of tower, rack-mount, and blade hardware offerings and channel programs that when coupled with our software, options, services, and storage expertise creates a channel partner that can take your business wherever you want it to go.

### Innovation that Matters

By providing innovative technology that delivers flexibility and high performance, easy to administer programs, and flexible financing options, IBM has an unmatched understanding and appreciation of channel importance that translates into success and prosperity for our partners.

Consider these facts about IBM:

- One of the world's top 10 most valuable brands

- Number one in worldwide server sales
- Second largest software business in the world
- In each year for over a decade, IBM earned more patents than any competitor, according to the U.S. Patent Office.

It is an exciting time to be involved with information technology. The worlds of business and computer systems are

#### MORE ON THE WEB

- [About IBM's patent portfolio](#)

blending in ways that will result in productivity breakthroughs greater than the sum of their parts. Teaming with IBM will allow you to provide

the insight, solutions, and innovation that matter to help your customers succeed.

## A Smarter Planet

IBM has launched an initiative known as the smarter planet. This new leadership agenda was born out of a need for change coupled with the unique opportunities now emerging for leaders of businesses and institutions worldwide.

We find ourselves at this moment because the crisis in our financial markets has jolted us awake. We are seriously focused now on the nature and dangers of highly complex global systems. And this isn't our first such jolt. Indeed, the first decade of the twenty-first century has been a series of wake-up calls with a single theme: the reality of global integration. The world is becoming increasingly instrumented, interconnected, and intelligent.

The problems of global climate change and energy, global supply chains for food and medicine, new security concerns

ranging from identity theft to terrorism—all issues of a hyperconnected world—have surfaced since the start of this decade. The world continues to get “smaller” and

“flatter.” But we see now that being connected isn’t enough. Fortunately, something else is happening that holds new potential: the planet is becoming smarter.

That is, intelligence is being infused into the way the world literally works—into the systems, processes, and infrastructure that enable physical goods to be developed, manufactured, bought, and sold... that allow services to be delivered... that facilitate the movement of everything from money and oil to water and electrons... and that help billions of people work and live.

One key element of the smarter planet agenda is the notion of a dynamic infrastructure that can adapt to meet changing needs. In fact, the dynamic infrastructure strategy will help guide the development and deployment of IBM hardware, software, and services. Let’s take a closer look at the dynamic infrastructure and the vital role IBM System x and BladeCenter play.

## Dynamic Infrastructure

A key element of IBM’s smarter planet initiative is known as the dynamic infrastructure highlighted in [Figure 1.1](#). This is

### MORE ON THE WEB

- [IBM CEO Sam Palmisano on A Smarter Planet](#)
- [A Smarter Planet info on IBM.com](#)



*Smart planet.  
Smart IT solutions*



**Figure 1.1.** IBM's dynamic infrastructure strategy helps IBM clients transform their current business and IT infrastructures to address their top three imperatives: improve service, reduce costs, and manage risk.

IBM's strategy to help IBM clients create an IT infrastructure that is designed for today's instrumented, interconnected, and intelligent world, transforming physical and digital assets into higher valued services. A dynamic infrastructure helps IBM clients transform their current business and IT infrastructure to address their top three imperatives (improve service, reduce costs, manage risk) through a structured approach. A dynamic infrastructure is highly optimized to achieve greater results and deliver superior business and IT services with agility and speed. IBM System x and BladeCenter products and services help implement the information infrastructure element of a dynamic infrastructure.

For example, IBM and VMware can help you implement a dynamic infrastructure with hardware and software designed for virtualization. As the first authorized reseller of VMware products, IBM offers the broadest portfolio of industry-stan-



standard System x and BladeCenter servers that can help you lower IT costs with unparalleled performance, extraordinary energy efficiency, and rock-solid reliability. Whether your business needs a virtual desktop solution or an enterprise-class server virtualization solution, IBM System x and BladeCenter provide you with innovative technology and exceptional services and support needed to build a dynamic infrastructure and make for a smarter planet.

## Why IBM System x and BladeCenter?

IBM relies on deep business experience, renowned research capabilities, and world-class technology to help businesses move forward. Here are some key points about how IBM System x and BladeCenter deliver this value.

### Realize Innovation

Combining open, industry standards with deep business experience and renowned research capabilities, the IBM X-Architecture blueprint equips System x and BladeCenter servers with innovative technology that makes IT easier and more reliable; proactive tools that help you manage complexity and support growth of your business and data center; and capabilities that help you become more efficient so you can go green and start saving. The ultimate goal is to help you realize innovation in your own business. Imagine enterprise servers, blade servers, rack servers, and solutions that are open, easy, and green with innovation that can help set you apart from the competition.

## IBM System x Enterprise Servers

IBM System x enterprise servers are the ideal platform for today's business-critical applications—like database processing, customer relationship management, and enterprise resource planning—and highly consolidated, virtual server environments. With multiple workloads running on the same server, performance remains important but reliability and availability become more critical than ever. IBM System x enterprise servers are built with eX4 technologies, which include a unique chipset and other advanced capabilities that give you higher throughput, exceptional reliability, and the ideal platform for virtualization.

## IBM System x Rack Servers

The philosophy regarding IBM System x rack-mount servers is “innovation comes standard.” IBM delivers next-generation technology today that the competition can't match. Some server vendors view uni- and two-socket servers as commodities, using off-the-shelf components to produce cookie-cutter servers with no added value. Instead, IBM X-Architecture system design begins with standard parts and adds innovation to create something more practical: outstanding dual- and quad-core performance, high availability, scalability, power efficiency, and proactive manageability.

## IBM BladeCenter Blade Servers

By integrating servers, storage, and networking, IBM BladeCenter is helping companies in every industry sweep com-

plexity aside. The blades contain all the necessities to run an application—processors, memory, I/O, and storage. The chassis contains shared redundant power, shared hot-swap cooling, DVD, integrated Ethernet, storage, switching, and consolidated powerful management. Its innovative, open design offers a true alternative to today's sprawling racks and overheated server rooms. So toss your cables. You have nothing to lose but complexity.

## IBM System x iDataPlex Servers

Designed for massive scale-out data centers, IBM System x iDataPlex introduces a new category that is designed to help your business use less space by doubling the number of servers you can run in a single rack while using less power and air conditioning. iDataPlex uses up to 40 percent less energy while increasing data center computing power by FIVE times. Reduce your energy costs even further with an optional liquid-cooled IBM Rear Door Heat eXchanger for iDataPlex, which allows the solution to run at "room temperature." With just a few adjustments, the liquid cooling feature can actually cool the ambient air of the data center as a whole.

## Reduce Costs

In today's financial climate, reducing costs is the top priority for CIOs, not just to drive down costs overall, but to use the dollars better. This requires not just incremental improvements in savings or cost reductions, but dramatic improvements in total cost of ownership as well. These improvements are brought about by leveraging energy efficiency, virtualiza-

tion, and consolidation with optimized systems and networks across all resources in the data center, alternative service delivery models, and standardization. With IBM System x and BladeCenter, organizations can help simplify the management of the IT infrastructure, improve utilization, and reduce costs.

**● *IBM System x and BladeCenter can significantly reduce operating costs without compromising reliability and performance.***

## Improve Service

A smarter planet is characterized by increasingly savvy customers and a proliferation of agile competitors. To succeed and win in today's fast-paced business landscape, organizations must transform their service delivery models to achieve superior, differentiated delivery of goods and services.

Smarter service delivery requires comprehensive visibility into the full breadth of business and IT assets that support services, effective control over those assets and the business processes they enable, as well as extensive automation of those processes so that services can be delivered more reliably and economically. Combining open industry standards with deep business experience and renowned research capabilities, the IBM X-Architecture blueprint equips System x and BladeCenter servers with innovative technology that makes IT easier and more reliable. IBM servers come standard with proactive tools that help customers manage complexity and support growth of their business and data center. Add innovation and you have best-of-breed System x and BladeCenter

ter systems built to industry standards that support leading third-party technology and operating systems for your customers' diverse computing workloads.

● ***IBM System x and BladeCenter help improve the service of IT in both the enterprise and mid-market.***

## Manage Risk

Enterprises of all sizes and industries are seeing that global expansion, emerging technologies, and the rising volume and sophistication of new threats has increased the need for improved security and resiliency measures. By enhancing security and resiliency, IT becomes more responsive and better prepared to meet the needs of a business. Some of these critical areas include infrastructure security and resiliency, information and data protection, and regulatory compliance. Proactive, secure integrated tools provided by System x and BladeCenter—for tracking and deploying assets, optimizing performance, and even enabling remote maintenance—provide a single, consistent interface so customers can more securely manage their IT. An intelligent system design that includes multiple layers of redundancy and memory protection, combined with advanced availability tools, provides the kind of critical resiliency customers need. The ultimate goal is to help customers realize innovation in their business. Imagine enterprise servers, blade servers, rack servers, and solutions that include risk-mitigation innovations that help set them apart from the competition.

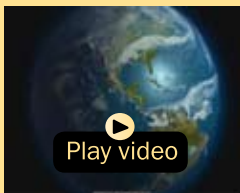
- ***IBM System x and BladeCenter provide the ability to manage present and future risks in challenging economic conditions.***

## IBM X-Architecture Benefits

- With X-Architecture, IBM leadership and experience provide excellent value at competitive prices.
- Proven mainframe-inspired innovations provide industry-leading resiliency and availability.
- The breadth and depth of the product portfolio provides a plethora of options.
- IBM eX4 technology provides revolutionary scalability up to 16 sockets and industry-leading reliability that elevate x86 to enterprise-class servers for database, enterprise applications, and virtualization.
- Industry-leading power and cooling efficiencies are achieved through IBM Cool Blue technologies.

### MORE ON THE WEB

- [X-Architecture info on IBM.com](#)



*X-Architecture—A Decade of Innovation (6:23)*

- Proactive management with a wide choice of hardware and software tools helps automate management tasks. Industry-leading reliability is gained through hardware and software tools.
- The IBM BladeCenter ecosystem is one of the largest ecosystems in

the industry, which fosters the delivery of faster and broader innovation than would be available otherwise.

- BladeCenter interoperability ensures that blades, switches, and adapters are interoperable in all chassis, providing mix-and-match deployment choices.

## IBM System x Rack and Tower Server Basics

IBM System x helps you take back control and reduce complexity by simplifying systems management for industry-standard computing environments. System x servers provide innovative technology features that deliver both time and cost-savings benefits. With outstanding value, System x servers showcase the best of IBM engineering, including the IBM X-Architecture innovation and the IBM Systems Director Active Energy Manager, covered later in this chapter.

### MORE ON THE WEB

- [System x awards and reviews](#)

Here are just a few examples of the many accolades System x has earned from the industry:

x3500 review in Serverwatch

*“With the x3500 server, IBM continues its tradition of providing a host of impressive uses of computing resources: It can do everything.”*

x3550 review in PC Authority

*“The x3550 delivers a superbly solid and well-designed foundation with a wealth of exciting new features.”*

## x3550 and x3950 review in Linux Magazine

*“The x3550 and x3950 machines have a cool, Darth Vader black case and cool blue LED.”*

## IBM BladeCenter Server Basics

You need to make IT decisions that will drive business success. You face management challenges and technological complexity such as space constraints, power and cooling limitations, heterogeneous environments, and I/O connectivity issues.

To meet your broad and diverse needs, you want your IT infrastructure to be flexible and modular. IBM BladeCenter offers a comprehensive portfolio of compatible chassis, blades, and switches that are easily managed from a common point. The IBM BladeCenter S is designed with everything a small office

with limited IT skills needs.

You need enterprise-class reliability to keep your business up and run-

ning. IBM BladeCenter is designed with extensive redundancy to reduce failures. Add tools that can help you quickly diagnosis a problem such as IBM Predictive Failure Analysis and light path diagnostics to help preserve application uptime.

*“In the world of data-center computing, there’s a lot of contention over whether deploying rackable servers is better than deploying blade servers to host consolidated or virtualized applications. Because IBM has been a*

### MORE ON THE WEB

- [Blade Open Specification](#)
- [Blade.org](#)
- [Article on racks vs. blades in NetworkWorld Magazine](#)



*top performer in recent server tests, for this hands-on exploration of blades vs. rackable servers, we tested IBM's state of the art in both categories..."*

—NetworkWorld Magazine

## Virtualizing on System x and BladeCenter

Utilization and efficiency can be increased by consolidating and virtualizing server workloads and applications. Your customers can simplify virtual-server deployments—especially when application requirements are growing or unpredictable—using System x enterprise servers with extra processor, memory, and I/O capacity that the competition can't match. If power consumption is your primary concern, consolidate onto BladeCenter servers and virtualize applications to better utilize resources and amplify the already-significant advantages of BladeCenter efficiencies. Virtualizing with BladeCenter also allows customers to choose from a broad range of reliable networking and storage with BladeCenter Open Fabric. When it comes to business-critical applications, IBM System x and BladeCenter offer the performance, availability, and resiliency your customers need.

## Save With IBM Energy Efficiency

The IBM X-Architecture platform equips System x and BladeCenter servers with technology to help your customers realize the innovation to become more efficient so they can go green and start saving. Innovations include Calibrated Vector Cooling design to maximize air flow, Active Energy Manager to control power usage, IBM Rear Door Heat eXchanger that can

remove 50,000 BTUs from a rack, and low-power memory, processors, and drives. And the iDataPlex 2U chassis design draws about one-third the typical fan power of a standard 1U server. All this engineering is designed to increase system reliability and availability while making the data center much more affordable to operate.

## Systems Management Made Easy

Because of the enterprise-level technology standard in IBM System x and BladeCenter servers, customers sometimes worry how to bring these servers into their IT infrastructure in a seamless fashion. Enter Systems Director 6.1, the latest version of our advanced management software. IBM servers come with a comprehensive management software portfolio which allows the servers to be managed either locally or remotely. Systems Director 6.1 comes standard, is simple to start, offers comprehensive management of both the physical and virtual system, allows for an automated, fast deployment, provides a single interface for the entire data center, and seamlessly plugs into many existing enterprise management solutions such as Tivoli and other non-IBM solutions. With additional tools like Active Energy Manager and BladeCenter Open Fabric Manager, System x and BladeCenter reduce the complexity of managing your data center.

## System x Naming Structure

The naming structure used with System x products assigns a meaning to each of the numbers. For example, in the name “IBM System x3800” (or x3800 for short) the first number

position indicates the type of server, so the "3" in "x3800" tells you it's an x86 server. The second number (an "8" in this case) is an indication of functionality. The third number tells you the type of mechanical packaging, "0" for tower or "5" for rack-mount, so you know the x3800 is packaged as a tower. The fourth number position tells you whether the server uses Intel processors "0" or AMD processors "5," so you know the x3800 uses Intel processors.

## What Are IBM Express Offerings?

While the needs of small and midsize businesses (SMB) often are conceptually similar to the needs of larger enterprises, the scale typically is smaller. For this reason, IBM developed an "Express" portfolio of offerings that has been specially designed for the SMB business sector. The Express portfolio of offerings is composed of IBM software, servers, storage, printers, services, education, and financing. These offerings are developed with input from IBM's small and midsize customers and the IBM Business Partners that help service them. Express offerings retain the functions and features sought most by midsize businesses and drop the more complex functions needed by larger enterprises. Yet, they still provide a non-disruptive way to scale up as a growing business... well... grows.

IBM Express offerings must meet very specific requirements in terms of usability, scalability, size, and price. To make them easier to install and manage, default configurations suitable for most implementations are provided. IBM offers many System x and BladeCenter products through the IBM Express program.

# 2

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## General System x and BladeCenter Resources

This chapter provides you with some general information and valuable resources that will help you as you sell IBM products.

### **The IBM PartnerWorld Website**

IBM maintains a Website called PartnerWorld which has a great deal of information of use to all IBM Business Partners worldwide. On the site you will find the latest presentations and marketing materials (such as brochures, data sheets, and case studies) as well as competitive information, consultant reports, IBM white papers, education and events, tools, technical support, and much more.

Business Partners who invest the most in IBM receive higher value benefits and resources. This investment is recognized through three PartnerWorld membership levels: Member, Advanced, and Premier. Qualification for these membership levels is based on the Business Partner's attainment according to a point system. Points are earned by acquiring skills, developing and selling solutions, driving IBM revenue, and achieving customer satisfaction.

In this guidebook, we have summarized and provided direct links to a great deal of PartnerWorld information of inter-

est to System x and BladeCenter Business Partners. As such, this guidebook is your personal “guide” to the PartnerWorld Website. Just the same, we encourage you to spend some time browsing the PartnerWorld site so you can get a feel for the full scope of resources available to you.

You will need your IBM-assigned user ID and password to access some areas of PartnerWorld. If you don’t have your user ID and password, you can contact IBM PartnerWorld for help. (Follow the link provided in the “More on the Web” box.)

#### MORE ON THE WEB

- [IBM PartnerWorld Website home page](#)
- [IBM PartnerWorld news and newsletters](#)
- [PartnerWorld membership levels](#)
- [Help with your user ID and password](#)

## IBM System x and BladeCenter Education

As with almost any endeavor, time spent educating yourself and your team on appropriate topics such as selling techniques and System x product offerings will help you succeed. In this chapter, we discuss options for you to obtain the System x related education you need.

### STG SMART Zone

The IBM STG SMART Zone is your one-stop education resource for all STG brands including System z, Power, Storage, System x, BladeCenter, and Retail Store Solutions. Find the most current education as well as roadmaps, certification information, tools, resources, and much more by plat-

## MORE ON THE WEB

- [STG SMART Zone](#)
- [Modular systems sales](#)
- [Modular systems technical](#)

form or job role. With hundreds of on demand learning opportunities, there is sure to be something you can use to help you be successful today and over the long term. The IBM STG SMART

Zone also provides information on IBM Skills Mastery, mastery tests, and certifications.

## Systems Connect eXpert Education Offering

The IBM Systems Connect eXpert offering is System x and BladeCenter specific. eXpert delivers System x and BladeCenter education in the form of easy-to-follow, flexible road maps designed to lead to IBM certification while helping you remain current on those urgent skills needed in the business world today.

Systems Connect eXpert tracks your education achievements as you progress through the education roadmaps.

## MORE ON THE WEB

- [Systems Connect eXpert Program](#)

Additionally, take advantage of the education modules delivered through the sales and technical pools to obtain additional training

on strategic topics that are not part of a specific certification track but are critical to help drive your business forward.

Get started by enrolling in five easy steps. Select your education roadmap of choice; sales, technical, or undecided. Then, start progressing through the education.

Systems Connect is also the exclusive home of the IBM Techline Data Repository, the same library that the IBM

Techline team uses to research System x product requirements.

## IBM Professional Certifications

Industry recognized IBM Professional Certifications offer IT professionals the opportunity to develop and demonstrate their IBM expertise to the world. IBM Certifications validate your skills and demonstrate your proficiency in the latest IBM technology and solutions. They help make certain that you have the capability to perform role-related tasks and activities at a specified level of competence.

At the firm level, IBM Certifications are required for an IBM Business Partner to move from the Member PartnerWorld level to the Advanced level and then Premier. IBM certifications are also required to participate in some Business Partner programs available in each geography. Over 70 percent of the firms producing over \$100K annually in IBM revenue have at least one individual within the firm with an IBM Certification.

Here are the basic steps in the certification process:

1. Select the certification you would like to pursue.
2. Determine which tests are required by reading the certification role description.
3. Prepare for the test. A great way to prepare for your System x Sales and Technical Certifications is by enrolling in the Systems Connect eXpert offering described above. Or, attend an IBM conference event where classroom training opportunities are offered.

4. Register to take a test by contacting one of our worldwide testing vendors.
5. Take the test.
6. Repeat steps 3 through 5 until all required tests are successfully completed for the desired certification role.

The System x and BladeCenter Specialist Certification Guide (see the link in the “More on the Web” box) provides more

#### MORE ON THE WEB

- [IBM Professional Certification info](#)
- [System x & BladeCenter Specialist Certification Guide](#)

information about the IBM Certification process. Earn an industry recognized IBM Certification.

## Other Education Listed on PartnerWorld

IBM PartnerWorld posts various educational opportunities as

#### MORE ON THE WEB

- [System x training listed on PartnerWorld](#)
- [BladeCenter training listed on PartnerWorld](#)

they arise. From time to time you will want to check the links provided in the “More on the Web” box to see what is available.

## Know Your IBM (KYI)

Know Your IBM is a permission-based interactive marketing and selling resource designed for Business Partner sellers. It provides net, customized, online education modules focusing on strategic product and solution areas. The education helps increase understanding and awareness of the key fea-



tures and business benefits of IBM products, solutions, and offerings. Incentives are offered in conjunction with

Know Your IBM are designed to motivate sales professionals to complete the education modules and provide rewards for performance. Incentives are awarded at the individual rep level, not the firm.

### MORE ON THE WEB

- [Know Your IBM training modules](#)

## Social Media Resources for IBM Business Partners

Social media is quickly growing in importance for businesses of all sizes. Whether you are already involved in social media or just getting interested, the “More on the Web” box provides some links that will be of interest to you.

### MORE ON THE WEB

- [IBM PartnerWorld communities](#)
- [Twitter search results for IBM System x OR BladeCenter](#)
- [Search Twitter for mentions of your business or competitors](#)
- [Google blog search results for IBM System x or BladeCenter](#)
- [Search blog for mentions of your business or competitors](#)
- [LinkedIn social network \(has an IBM Business Partner Group\)](#)

## Performance Benchmarks

Trying to judge the performance of servers by comparing the individual component (processor, disk, memory, etc.) specifications can be misleading. A better way to compare

## MORE ON THE WEB

- [System x performance benchmarks](#)
- [BladeCenter performance benchmarks](#)

the performance of servers is to run specially designed software that simulates various types of workloads and measures the time it takes to complete tasks. This is known as benchmark testing. You can find detailed information on benchmark testing and the latest benchmark testing results for System x and BladeCenter by following the links in the “More on the Web” box.

## Success Stories, References, Case Studies

It is often helpful to make prospective customers aware of other businesses that have successfully implemented solutions based on System x and BladeCenter. For this reason, IBM maintains a database of existing customer success stories, complete with company profiles, identified needs, solutions, and resulting benefits. IBM Business Partners can use these success stories with customers to advance the sell cycle. To see what is available, simply follow the links provided in the “More on the Web” box.

## MORE ON THE WEB

- [System x and BladeCenter success stories](#)



*Customer Testimonials (multiple videos)*

## Sources for Competitive Marketing Information

IBM maintains a Website called “Comp” which is a worldwide portal for information that will help you win in competitive marketing situations. It includes a searchable set of reports, presentations, and quick reference cards about the marketplace, competitors, and competitive products. You will find materials developed by IBM as well as outside sources such as Gartner, IDC, DH Brown, and IDEAS International.

At the “Comp” site you can also download the “IBM System x Competitive Sales Tool” (after requesting a password via email), which is updated regularly and is the most extensive source of competitive information. Be sure you also sign up to automatically receive email notification (along with the new password you will need) when a new version of the tool is posted.

### MORE ON THE WEB

- [IBM “Comp” Website](#)
- [IBM System x competitive sales tool](#)

## Playbook/Sales Kits for System x and BladeCenter

This IBM Playbook includes a great selection of System x and BladeCenter plays to help you generate new opportunities in your territory. Each play focuses on a set of common client pain points and recommends specific solutions to address them. To offer your clients more complete solutions, make

### MORE ON THE WEB

- [Playbook for System x and BladeCenter](#)
- [Speed sheets](#)

your deals more profitable, and increase your win odds, you'll also want to check out the sections on financing, services, and storage.

## Web Content Syndication (for your Website)

IBM Business Partners that market and sell IBM servers, storage, workstations, services, and software can improve their Web presence for FREE by leveraging syndicated Web con-

### MORE ON THE WEB

- [Web content syndication](#)

tent from ibm.com to their own Websites. IBM has teamed with WebCollage, Inc. to provide the capability for Premier, Advanced, and

Member level PartnerWorld participants to receive Web content dynamically delivered into their Websites.

## Configurator Tools for Specifying Servers

IBM has created several tools to help you configure specific server solutions as necessary to get pricing and place an order.

There are tools (PDF files, spreadsheets, etc.) that help you

### MORE ON THE WEB

- [Configurator tools](#)

configure System x servers, BladeCenter servers, and racks of servers. You can explore these tools by following the link provided in the "More on the Web" box.

## Attaching Accessories and Upgrades to Your Proposals

There are many optional accessories and upgrades for all IBM System x and BladeCenter servers. These options include things like memory upgrades, processor upgrades, storage

devices, racks, power solutions, networking devices, monitors, and input devices. Don't forget to include options that improve the value of the solution you are proposing to your customers. You will find a comprehensive listing of these options by following the links in the "More on the Web" box.

#### MORE ON THE WEB

- [System x accessories](#)
- [Tape storage](#)
- [Rack, stack & power](#)

## Attaching Operating Systems to Your Proposals

All IBM System x and BladeCenter servers need an operating system, so it makes sense that you should discuss with your customers what OS is going to be deployed on the hardware. You can now deliver a more convenient and complete solution for your customers by including the operating system on new hardware. Operating systems from Microsoft, Novell/SUSE Linux, Red Hat, Sun Solaris, and VMware are available from IBM on a server. You can consult the configurator tools (see above) for a comprehensive list of which operating systems are available with each server. You will find a comprehensive listing of operating systems within the software accessories by following the link in the "More on the Web" box.

#### MORE ON THE WEB

- [System x operating systems](#)

## Attaching Storage to Your Proposals

Whenever you are proposing the sale of a System x or BladeCenter server (IBM or other brand), it only makes sense to

include the needed storage devices in the original proposal. Selling storage with servers is known as “clothing” the servers with storage devices. Properly clothing a server allows you to offer a complete solution while also increasing your profits. IBM’s line of storage devices falls under the System Storage brand and includes disk storage, tape storage, and storage management software.

The IBM System Storage DS3000 series product family replaces the IBM TotalStorage DS300 and DS400 disk systems. The award-winning DS3000 family of entry storage products is S.A.F.E.R; Scalable, Affordable, Flexible, Easy, and Reliable. It is scalable because you can grow to over 14 TB of capacity. It is affordable because it is an excellent value starting at just under \$4,500 USD. It is flexible because the DS3000 series attaches to System x, BladeCenter, and select third party servers, making it perfect for a mixed-vendor environment. It is easy because the DS3000 Storage Manager (included at no charge) makes deployment and installation simple. It is reliable because the system comes from IBM, one of the most

#### MORE ON THE WEB

- [Storage products for System x and BladeCenter servers on IBM.com](#)

trusted vendors in the industry. With the new DS3000 series family, you get the same outstanding quality and

support that you have come to expect from IBM’s DS family of disk storage systems. The DS3000 series offers both direct-attach and SAN-attach models.

The IBM System Storage DS4000 series mid-range storage systems offer affordability, flexibility, and high-performance.

The DS4000 models are designed to deliver high-bandwidth performance to both Windows and UNIX environments. With modular designs and models at multiple price points, DS4000 storage systems can be used as storage add-ons or integral components of multi-tiered enterprise infrastructures.

Here are some additional considerations for clothing System x and BladeCenter servers with System Storage products:

- IBM System Storage with System x or BladeCenter servers can provide integrated storage solutions with a broad range of operating system support to deliver exceptional price, performance, and availability.
- Server consolidation storage networking options enable tape library and disk sharing to support lower TCO by spreading the cost of the library and storage arrays across multiple servers.
- There are “IBM Express” models of System Storage products that provide System x solutions specially configured and priced for the small and midsize business environment (see “What Are ‘IBM Express’ Offerings?” in Chapter 1).

## Attaching Services to Your Proposal

Attaching IBM Global Technology Services to your IBM solution sales gives you a way to enhance your productivity, accelerate sales, and increase deal size today while creating ongoing revenue opportunities for the future—creating offerings that are more attractive to your clients than ever before.

CIOs, IT directors, and business leaders in client organizations of all sizes across all industries see tremendous value in IBM Global Technology Services. Our offerings can provide powerful supplements to their internal resources, opportunities to save money, and programs to enhance the effective-

#### MORE ON THE WEB

- [Service offering info on PartnerWorld](#)

ness of their technology investments. And IBM gives you a way to complement your resources and capabilities. The

result is that IBM Global Technology Services can help increase your client satisfaction because you can offer a more complete solution.

IBM Global Services provides structured and standardized approaches backed by industry-leading experts who can help plan, design, install, configure, tune, test, and support solutions; speed time to value; reduce risk; and minimize disruption to IT and business operations.

## Attach Connector Cross Selling Tool

Attach Connector is designed to super-size your sales by helping you sell more IBM hardware, software, and services with each sales opportunity. This cross-selling tool carefully walks you through a sale by providing the right questions to ask to uncover new opportunities and deliver more complete solutions. As you select an IBM point product, a list of the most common attach elements is suggested. The tool also provides key play opportunities where you can pass discounts and promotions to clients, as well as the IBM competitive advantage—why IBM over other specific companies.



When you buy a suit, a salesman will undoubtedly ask if you want a shirt and tie. Likewise, when we sell servers, we want to ask if the client wants storage, software, or services because underneath every product sale there is a much larger cross-brand opportunity. Attach Connector helps sales reps mine that larger deal by showing natural product pairings to roll your own custom solution.

#### MORE ON THE WEB

- [Attach Connector cross selling tool](#)

## System x Turn-Key Solutions

Working closely with IBM Business Partners, IBM has tuned-up and optimized the System x portfolio of servers in order to provide a flexible, cost-effective platform for building solutions. The result—highly reliable servers that can scale quickly, easily, and inexpensively so you can stretch your IT budget and confidently execute your business objectives, even as conditions change.

There is a growing set of solutions in areas such as client consolidation, collaboration, database, ERP/CRP, grid computing, high availability & clustering, HPC clusters, security, server consolidation, systems management, virtualization, and VoIP, just to name a few.

#### MORE ON THE WEB

- [System x turn-key solutions](#)

To gain further insight into these solutions, let's look at two examples: Integrated virtualization with VMware ESXi 3.5 and SAP Solutions for small and midsize businesses.

## Integrated Virtualization with VMware ESXi

With industry-leading technology from IBM and VMware, the transition to virtualization just got easier to manage with VMware ESXi 3.5 integrated on select System x and BladeCenter servers. Simply power up your IBM server and deploy virtual machines in a matter of minutes. This intelligent, integrated solution delivers outstanding performance and scalability, rock-solid reliability, and enhanced security with a robust foundation designed to help reduce costs and keep your virtualized infrastructure up and running.

VMware ESXi 3.5 is an operating system-independent, thin hypervisor designed for rock-solid reliability, simplified management, and enhanced security. For more advanced capabilities, VMware ESXi 3.5 may be upgraded to VMware Infrastructure 3 Foundation, Standard, or Enterprise edition

### MORE ON THE WEB

- [Integrated virtualization solution info on IBM.com](#)

licenses. IBM offers System x and BladeCenter servers pre-tested and integrated

with VMware ESXi 3.5 allowing you to deploy and manage virtual machines quickly and easily with robust platforms built for reliable virtualization.

## SAP Solutions for Small and Midsize Businesses

SAP offers a complete range of enterprise software applications and business solutions to drive businesses ranging from enterprise to small. It offers these business applications and solutions to handle every aspect of the business. The Windows and Linux markets are important to SAP and IBM Sys-

tem x/BladeCenter is an ideal platform for SAP solutions. SAP and IBM have worked closely on many levels, from joint product development to end-customer support, to providing turn-key solutions to customers.

To stay profitable and remain competitive, small and mid-size businesses (SMBs) must manage their operations efficiently and cost-effectively—while overcoming the unique challenges that SMBs face. IBM and SAP understands these challenges. That's why we offer SAP Business One and mySAP All-in-One: solutions designed specifically for SMBs.

SAP Business One is an easy-to-use business and operational management solution for emerging and dynamic businesses ranging in size from 10 to several hundred employees. The solution is simple yet powerful, allowing an immediate and complete view of both business operations and customer activities. If your company is located in the United States, please visit the new SAP Business One collaboration site to discover a new and different way to work with SAP Business Partners.

mySAP All-in-One is a prepackaged, industry-specific version of mySAP Business Suite with built-in content, tools,

## MORE ON THE WEB

- [SAP applications for System x and BladeCenter info on IBM.com](#)
- [SAP on System x standard offerings \(zip file\)](#)
- [SAP on System x info on PartnerWorld](#)
- [The benefits of running SAP solutions on System x and BladeCenter Redbook](#)
- [SAP solutions for SMB info on SAP.com](#)

and methodologies for a cost-effective, turnkey implementation. mySAP All-in-One solutions offer out-of-the-box flexibility combined with the power of SAP's world-class business solutions.

SAP Business One and mySAP All-in-One are affordable solutions that can be implemented quickly and easily. They're scaled to grow with you as your business grows. And they're delivered through a network of qualified, professional partners.

## IBM Global Financing

IBM Global Financing (IGF) continues to focus on meeting customer needs by concentrating on key business areas: leasing and lending, remarketing and refurbishing, and asset management. IGF conducts business in more than 40 countries, financing IBM and non-IBM hardware, software, and services, with a full range of flexible, low-rate offerings. IGF's customers find that financing their information technology solutions offers many advantages in both robust and difficult economic climates because financing frees up their capital for other investments. Many information technology installations, including those for customer relationship management, data mining, and e-business, require a substantial investment. IGF financing enables customers to pay for their new technology in affordable monthly payments during the life of the project. Our customers run the gamut from the smallest, family-

owned business purchasing a single server and software to the largest, multi-national corporation, acquiring tens of thousands of PCs for offices

### MORE ON THE WEB

- [IBM Global Financing](#)

on several continents. In addition to working directly with customers, we work with IBM Business Partners to provide financing for their clients and to help them build their own businesses.

## Technical Support for Business Partners

Technical sales support from IBM provides Business Partners with extensive pre-sales support through the PartnerWorld program online via the Web and by voice. Voice support can be accessed via PartnerWorld Contact Services, the single point of entry to all key support organizations. PartnerWorld Contact Services provides access to Techline for hardware and software tech-

nical sales support, as well as Competeline for win strategies and competitive in-

formation. Systems Business Partners entitled through the PartnerWorld program have access to IBM System x and IBM System Storage solutions and selected major competitive platform support including:

- Remote solution design assistance/review
- Technical marketing assistance
- Product and promotion information
- Configuration assistance
- Competitive product information

### MORE ON THE WEB

- [Contact Techline](#)
- [Technical Sales Library](#)
- [PartnerWorld technical resources and support](#)

- Sales strategy information
- Solution assurance assistance.

Follow the links in the “More on the Web” box to access Technical Sales Support online (region selectable).

# 3

## System x Product Quick Reference

In this chapter, we explore the System x products you will be selling and offer some resources that will help you succeed. System x servers are divided into three groups: tower servers, rack-mount servers, and enterprise servers. Let's take a look at each.

### MORE ON THE WEB

- [Overview of all System x “tower” servers](#)

## Tower Servers

In this section, we look at the specific IBM System x models that use traditional (and some not so traditional) “tower” mechanical packaging. This packaging offers flexibility by providing internal expansion capability. Though most tower servers are intended to rest on the floor beside a user's desk, IBM also offers conversion kits that allow these servers to be used in industry-standard 19-inch racks.

### x3200 M2

The IBM System x3200 M2 ([Figure T.1](#)) is a single-socket tower server that offers more performance, configuration flexibility, and availability features than many servers in its class. It is designed to meet a wide range of business needs—and help you adapt to changing business requirements.



## Specifications

Form factor	Tower/5U (rack mountable)
Processor (CPU GHz/L2 cache/ front-side bus MHz max)	Intel Xeon quad-core up to 3.16 GHz/12 MB/1333 MHz or Intel Xeon dual-core up to 3.0 GHz/6 MB/1333 MHz
Number of processors (std/max)	1/1
Memory (std/max)	512 MB up to 2 GB/up to 8 GB DDR II 667 or 800 MHz
Expansion slots	Two PCI (32-bit/33 MHz), 2 PCI-Express (x8, x1), optional PCI-X, or hardware RAID-0, -1, Remote Supervisor Adapter II SlimLine slot
Disk bays (total/hot-swap)	Four 3.5" simple-swap or hot-swap SATA, four 2.5"/3.5" hot- swap SAS or eight 2.5" hot-swap SAS hard disk drives through configuration order
Maximum internal storage	Up to 1.17 TB SAS or up to 4.0 TB SATA HDDs
Network interface	Integrated Gigabit Ethernet
Power supply (std/max)	400W 1/1 or 430W hot-swap redundant 2/2
RAID support	Integrated RAID-0/-1 standard for hot swap models, optional for simple swap models. RAID-5 is optional for all models.
Ports	Six USB; Ethernet, two serial, parallel, and video
Systems management	IPMI 2.0-compliant mini-BMC2, IBM Systems Director, Alert Standard Format 2.0, IBM ServerGuide, optional RSA II SlimLine, and Remote Deployment Manager
Operating systems supported	Microsoft Windows Server 2003 and 2008, Windows Small Business Server 2003, Red Hat Linux, SUSE Linux
Limited warranty	1-year or 3-year customer replaceable unit and onsite limited warranty

- [x3200 M2 details on PartnerWorld](#)
- [x3200 M2 details on IBM.com](#)
- [x3200 M2 competitive info on COMP](#)

**Figure T.1.** IBM System x3200 M2 at a glance (and links to more detail).



The x3200 M2 offers the latest quad-core or dual-core processors. Providing up to 4.0 TB of disk storage, you can configure up to eight 2.5-inch hot-swap SAS drives for added flexibility and performance. Integrated slotless hardware RAID and internal tape backup support help protect your valuable data.

The x3200 M2 provides integrated systems management through its mini-BMC2. Upgrade to the Remote Supervisor Adapter II SlimLine card to manage distributed systems remotely.

A proven platform that delivers performance and reliability, the x3200 M2 helps minimize costs, better manage complexity, and protect system investments. Select configurations of the x3200 M2 are part of the IBM Express Advantage Portfolio, designed and priced to meet the needs of midsize businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick x3200 M2 facts:

- Manage growth and risk with configuration flexibility, data protection, and application performance
- Manage complexity with integrated and remote management options
- Standard features deliver high levels of system availability—at a value price.

## x3400

The IBM System x3400 ([Figure T.2](#)) is an excellent low-cost solution for growing businesses or branch offices that rely on



## Specifications

Form factor/height	Tower/5U
Processor (max)	Dual-Core Intel Xeon Processor 5205 up to 1.86 GHz and up to 1066 MHz front-side bus or Quad-Core Intel Xeon Processor E5430 up to 2.66 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
L2 cache	2x6 MB (dual-core) or 2x12 MB (quad-core)
Memory (std/max)	1 GB/32 GB Fully Buffered DIMM 667 MHz via eight DIMM slots
Expansion slots	3 PCI-Express, 2 PCI-X, and 1 PCI
Disk bays (total/hot-swap)	4/0 or 8/8 (model dependent)
Maximum internal storage	6.0 TB hot-swap SATA, 2.4 TB hot-swap SAS, or 3.0 TB simple-swap SATA
Network interface	Integrated Gigabit Ethernet
Power supply (std/max)	670W 1/1 or 835W 1/2
Hot-swap components	Power supply, fans, and hard disk drives
RAID support	Integrated RAID-0/-1/-10, optional RAID-5
Systems management	Automatic Server Restart; IBM Predictive Failure Analysis on hard disk drives, processors, VRMs, fans, and memory; integrated IPMI System Management Processor; IBM Systems Director; optional Remote Supervisor Adapter II SlimLine and IBM ServerGuide
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Novell NetWare, SCO OpenServer, and UnixWare
Limited warranty	1-year or 3-year customer replaceable unit and onsite limited warranty

- [x3400 details on PartnerWorld](#)
- [x3400 details on IBM.com](#)
- [x3400 competitive info on COMP](#)

**Figure T.2.** IBM System x3400 at a glance (and links to more detail).

24x7 availability and mission-critical applications. Optional features let you configure a server customized for your needs—from basic file-and-print to a robust, mission-critical application server—saving you time and money.

For small organizations with big plans, the x3400 can grow with you. Deploy an infrastructure with less hardware that supports the same—or more—applications. Start with a basic configuration and add features and capacity to accommodate your growing business.

For branch offices with demanding, complex data transactions, the x3400 offers dual-socket computing power and support for up to eight-core processor performance, making the x3400 an affordable yet robust system.

Here are some quick x3400 facts:

- Value-priced, two-socket design allows for affordable business growth and performance
- Flexible configuration options meet today's business needs while allowing for future growth
- Optional redundant features help protect business-critical data with minimal IT support.

## x3400 M2

The IBM System x3400 M2 ([Figure T.3](#)) offers the availability and reliability you need at a price you can afford. Designed for flexibility and growth, this dual-socket server offers exceptional value and accommodates expanding business needs.



### Specifications

Form factor/height	Tower/5U (rack-mountable)
Processor(max)	Intel Xeon E5540 up to 2.53 GHz and up to 8 MB cache
Number of processors (std/max)	1/2
Cache (max)	4 MB or 8 MB per processor socket
Memory (max)	2 GB/96 GB registered DDR-3 DIMMs
Expansion slots	5 PCI-Express and 1 PCI; additional 2 PCI-X or 1 PCI-E (optional via CTO)
Disk bays (total/hot-swap)	Four 3.5" or eight 2.5" (model dependent)
Maximum internal storage	4.0 TB hot-swap Serial ATA hard disk drives (HDDs); 1.2 TB hot-swap SAS, 3.0 TB simple-swap Serial ATA, or 2.4 TB hot-swap SFF SAS
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	670 W 1/1
Hot-swap components	Hard disk drives, fans
RAID support	Integrated RAID-0, -1, -1E (software or hardware, model dependent), optional RAID-10, -5, -50, -6, -60
Systems management	Integrated management module (IMM); optional remote presence hardware key; IBM Systems Director; IBM Systems Director Active Energy Manager
Operating systems supported	Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enter- prise, VMware ESX
Limited warranty	1-/3-year customer replaceable unit and onsite limited warranty

- [x3400 M2 details on PartnerWorld](#)
- [x3400 M2 details on IBM.com](#)
- [x3400 M2 competitive info on COMP](#)

**Figure T.3.** IBM System x3400 M2 at a glance (and links to more detail).

The x3400 M2 offers flexible configuration options and easy migration through support for a wide range of technologies. Start with a single Intel Xeon four-core processor and add a second to double your processing capability. Select the right combination of hard disk drive size, capacity, and performance for today and easily incorporate additional drives tomorrow.

Out-of-the-box systems management support, including predictive failure analysis and an integrated management module with optional remote presence key help reduce on-site IT support costs. In addition, RAID capabilities enhance application resiliency and performance. Select configurations of the x3400 M2 are part of the IBM Express Advantage Portfolio designed to meet the needs of midsize businesses. Easy to manage, Express models and configurations vary by country.

Here are some quick x3400 M2 facts:

- Helps lower IT lifecycle costs while providing outstanding performance
- Customizable design with configuration flexibility for affordable growth
- Provides extensive systems management capabilities right out of the box.

## x3500

The IBM System x3500 ([Figure T.4](#)) delivers unprecedented performance and reliability for demanding distributed environments that rely on 24x7 availability of mission-critical applica-



### Specifications

Form factor	Tower/5U
Processor (max)	Up to two Quad-Core Intel Xeon X5460 up to 3.16 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
L2 cache	2x12 MB (quad-core)
Memory (std/max)	1 GB/48 GB Fully Buffered DIMM 667 MHz via 12 DIMM slots
Expansion slots	3 PCI-Express, 2 PCI-X, and 1 PCI
Disk bays (total/hot-swap)	8/8 or 12/12 (SFF)
Maximum internal storage	2.4 TB hot-swap SAS, 6.0 TB hot-swap SATA, 1.76 TB hot-swap SFF
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	835W 1/2
Hot-swap components	Power supply, fans, and hard disk drives
RAID support	Integrated RAID-0, -1, -1E, -5, -6, -10
Systems management	Automatic Server Restart; IBM Predictive Failure Analysis on hard disk drives, processors, VRMs, fans and memory; light path diagnostics with side viewable panel; integrated IPMI System Management Processor; IBM Systems Director; optional Remote Supervisor Adapter II SlimLine and IBM ServerGuide
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Novell NetWare, SCO OpenServer, and UnixWare
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [x3500 details on PartnerWorld](#)
- [x3500 details on IBM.com](#)
- [x3500 competitive info on COMP](#)

**Figure T.4.** IBM System x3500 at a glance (and links to more detail).

tions. With up to eight-core processor performance at lower power consumption per core, the x3500 offers leading-edge capacity and high-speed I/O scalability. A long-life platform with 24-month availability, the x3500 minimizes deployment and support concerns. Take advantage of virtualization with the x3500. Deploy an infrastructure with less hardware that supports the same—or more—applications with lower hardware support costs.

The x3500 offers many advanced availability features standard, including advanced data protection for high system reliability at no extra cost. Other high-availability features such as redundant components, advanced memory protection, integrated systems management, and large storage capacity help keep your system up and running 24x7. Select configurations of the x3500 are part of the IBM Express Advantage Portfolio, designed to meet the needs of midsize businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick x3500 facts:

- Achieve excellent price/performance with this industry-leading, two-socket server
- Stable platform life optimizes IT investment
- Manage and protect mission-critical applications with scalable memory, I/O, and storage.

## x3500 M2

The IBM System x3500 M2 ([Figure T.5](#)) delivers outstanding quad-core performance and availability to help keep mission-critical applications and virtualized environments up and run-



## Specifications

Form factor/height	Tower/5U (rack-mountable)
Processor (max)	Intel Xeon X5570 up to 2.93 GHz and up to 8 MB cache
Number of processors (std/max)	1/2
Cache (max)	8 MB per processor socket
Memory (max)	2 GB/128 GB max 1333 MHz DDR-3 registered DIMMs via 16 DIMM slots
Expansion slots	6 PCI-Express, 1 PCI, 2 PCI-X (optional—requires removal of 1 PCI-Express)
Disk bays (total/hot-swap)	16/16 (SFF) (8 standard with additional 8 available via CTO)
Maximum internal storage	2.4 TB hot-swap 2.5-inch Serial Attached SCSI (SAS) standard; 4.8 TB hot-swap 2.5-inch Serial Attached SCSI (SAS) via CTO
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	920 W 1/2
Hot-swap components	Power supply, fans, and hard disk drives
RAID support	Integrated Hardware RAID-0, -1, -1E, optional RAID-5, -6, -10, -50, -60
Systems management	Automatic Server Restart; IBM Predictive Failure Analysis on hard disk drives, processors, voltage regulator modules (VRMs), fans, and memory; light path diagnostics; integrated management module; remote presence (standard); IBM Systems Director and IBM Systems Director Active Energy Manager
Operating systems supported	Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware ESX and ESXi
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [x3500 M2 details on PartnerWorld](#)
- [x3500 M2 details on IBM.com](#)
- [x3500 M2 competitive info on COMP](#)

**Figure T.5.** IBM System x3500 M2 at a glance (and links to more detail).



ning. Redundant components to reduce points of failure and light path diagnostics provide resiliency, while integrated support features like a remote presence key optimize systems management efficiency.

A long-life platform, the x3500 M2 provides exceptional stability in a volatile marketplace. Flexible configurations and a generous storage capacity enable emerging enterprise environments to meet the demands of today and easily grow to accommodate additional applications as business requirements evolve.

The x3500 M2 harnesses the benefits of the latest Intel Xeon quad-core technology, including faster processing, simultaneous multi-threading, and dynamic power management. It builds on standard technology to offer superior power efficiency and proactive manageability through built-in capabilities for monitoring, measurement, and management of energy consumption. Select configurations of the x3500 M2 are part of the IBM Express Advantage Portfolio, designed to meet the needs of midsize businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick x3500 M2 facts:

- High availability features and integrated systems management tools maximize uptime
- Stability combined with flexible growth options delivers increased investment protection
- The latest processor technology with superior energy-management and cooling efficiency.

## Rack-Mount Servers

In this section, we explore the IBM System x rack servers. These are designed compactly to fit into industry-standard

### MORE ON THE WEB

- [Overview of all System x rack servers](#)

19-inch server racks that save valuable data center floor space.

### x3250 M2

The IBM System x3250 M2 ([Figure R.1](#)) is a single-socket server with power consumption, noise reduction, and space optimizations that make it perfect for any business looking for a reliable, compact workgroup or departmental server. It can be dedicated to a single application and is priced right for your budget.

Designed for infrastructure applications, the x3250 M2 leverages the latest dual-core and quad-core processor technology. The x3250 M2 fits into about the same area as many Ethernet switches, enabling more efficient use of existing data center space. Quiet fans won't disturb your office environment. And since it plugs into a 110-volt outlet, you can deploy it anywhere.

The x3250 M2 offers built-in reliability features such as mini-BMC2 and optional Remote Supervisor Adapter II Slim-Line that enable remote manageability from a single console. Select configurations of the x3250 M2 are part of the IBM Express Advantage Portfolio, designed and priced to meet the needs of midsize businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick x3250 M2 facts:



**Specifications**

Form factor/height	Rack/1U
Processor (CPU GHz/L2 cache/front-side bus MHz max)	Intel Xeon quad-core up to 3.0 GHz/12 MB/1333 MHz or Intel Xeon dual-core up to 3.16 GHz/6 MB/ 1333 MHz or Intel Core 2 Duo up to 2.80 GHz/3 GB/ 1066 MHz or Intel Pentium dual-core up to 2.66 GHz/2 MB/800 MHz or Intel Celeron up to 2.0 GHz/512 KB/800 MHz 2 MB/800 MHz) or Intel Celeron (up to 2.0 GHz/512 KB/800 MHz)
Number of processors (std/max)	1/1
Memory (max)	1 GB standard/8 GB maximum 667 MHz or 800 MHz via 4 DIMM slots
Expansion slots	1 PCI-Express (x8), 1 PCI-Express (x4)
Disk bays (total/hot-swap)	Two 3.5" simple-swap SATA or 3.5" hot-swap SAS/SATA or four 2.5" hot-swap SAS HDDs
Maximum internal storage	2.0 TB SATA or 1.2 TB SAS
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	350W 1/1
RAID support	Integrated hardware RAID-0, -1 standard hot-swap models and optional simple swap models; RAID-5 optional for hot-swap and simple swap models
Systems management	IPMI 2.0-compliant mini-BMC2, optional Remote Supervisor Adapter II SlimLine
Operating systems supported	Microsoft Windows Server 2008, Microsoft Windows Server 2003, Windows Small Business Server 2003 R2, Red Hat Enterprise Linux 5, SUSE Linux Enterprise Server 10
Limited warranty	1-year or 3-year customer replaceable unit and onsite limited warranty

- [x3250 M2 details on PartnerWorld](#)
- [x3250 M2 details on IBM.com](#)
- [x3250 M2 competitive info on COMP](#)

**Figure R.1.** IBM System x3250 M2 at a glance (and links to more detail).

- Maximize return on IT investments with low entry price, small form factor, and less power consumption
- Manage risk with enhanced reliability features and full remote management
- Manage complexity of IT with greater flexibility to meet a wide range of stateless infrastructure needs.

## x3350

The IBM System x3350 ([Figure R.2](#)) is a single-socket commercial application server that provides outstanding reliability, availability, and serviceability features, management control, and levels of performance previously available only with dual-processor systems. The x3350 affords lower costs, with leaner power and cooling consumption than competitive 1U, two-processor servers.

Designed for single-application hosting in a non-blade environment, the x3350 provides availability features. The x3350 is ideal for deployments that require a dedicated server, if the application vendor doesn't support virtualization, or if the application doesn't scale to take advantage of multiple sockets.

Here are some quick x3350 facts:


- Go green and save with affordable, energy-efficient, high-performance quad-core computing
- Manage growth and risk with scalability, flexibility, and security to respond to business change



**Specifications**

Form factor/height	Rack/1U
Processor (CPU GHz/L2 cache/front-side bus MHz max)	Intel Xeon (dual-core) (up to 3.16 GHz/6 MB/1333 MHz) or Intel Xeon (quad-core) (up to 3.0 GHz/12 MB/1333 MHz)
Number of processors (std/max)	1/1
Memory (std/max)	1 GB or 2 GB/8 GB PC2-6400 DDR II 800 MHz via 4 DIMM slots
Expansion slots	2 PCI-Express x8
Disk bays (total/hot-swap)	Up to four 2.5" simple swap or hot-swap SATA or SAS HDDs
Maximum internal storage	Up to 2.0 TB SATA or 600 GB SAS
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	450 W 1/2
Hot-swap components	Power supply, fans, hard disk drives
RAID support	Integrated hardware RAID-0, -1 standard; RAID-5 optional
Systems management	IPMI 2.0-compliant full Base Management Controller (BMC), Automatic Server Restart, IBM Director, IBM ServerGuide, Remote Deployment Manager, IBM Wake on LAN
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, Novell NetWare
Limited warranty	1- or 3-year customer replaceable unit, onsite limited warranty

- [x3350 details on PartnerWorld](#)
- [x3350 details on IBM.com](#)
- [x3350 competitive info on COMP](#)



Play video

**Figure R.2.** IBM System x3350 at a glance (and links to more detail).

- Manage complexity with integrated systems management tools.

## x3450

The IBM System x3450 ([Figure R.3](#)) provides maximum performance for a fixed investment, enabling organizations to run compute-intensive applications. High performance is thanks to quad-core and dual-core processors with 1600 MHz front-side bus to speed I/O and 16 fully buffered DIMMs for large memory addressability. Both allow organizations to run applications more quickly. In addition to the above, the x3450 comes with a high bandwidth x16 PCI Express slot for maximum I/O adapter throughput.

The x3450 is designed with fewer general purpose features and minimal hardware component redundancies. It provides scalable memory solutions to accommodate expansion. Building on existing systems, organizations can plan for future growth while protecting their investment.

Here are some quick x3450 facts:


- Features industry-leading technology to deliver maximum performance for minimal investment
- Helps manage growth, complexity, and risk with large memory addressability and scalable systems
- Saves valuable real estate for large cluster deployments due to its 1U space-saving design.



**Specifications**

Form factor/height	Rack/1U
Processor (max)	Quad-Core Intel Xeon X5482 up to 3.2 GHz and up to 1600 MHz front-side bus or Dual-Core Intel Xeon X5272 up to 3.40 GHz and up to 1600 MHz front-side bus
Number of processors (std/max)	2/2
L2 cache	2 MB per socket
Memory (std/max)	2 x 4 GB/64 GB Fully Buffered DIMM 800 MHz
Maximum internal storage	1.5 TB simple-swap SATA (3.5" drives)
Network interface	Integrated dual Gigabit Ethernet
Expansion slots	PCI-Express (1) x16 standard
Disk bays (total)	2
Power supply	600W capacity
Operating systems supported	Microsoft Server 2003 R2, Red Hat Enterprise Linux, SUSE Linux Enterprise Server
Limited warranty	1-year customer replaceable unit and onsite limited warranty

- [x3450 details on PartnerWorld](#)
- [x3450 details on IBM.com](#)
- [x3450 competitive info on COMP](#)



**Figure R.3.** IBM System x3450 at a glance (and links to more detail).

## x3455

The IBM System x3455 ([Figure R.4](#)) delivers robust performance in a small package at an affordable price. For scientific, technical, and financial applications, the x3455 provides the latest AMD Opteron quad-core processors—helping process data more quickly. The x3455 also provides outstanding memory performance with power-efficient DDR II memory and AMD Direct Connect Architecture. And high-performance 3.5-inch SAS hard disk drives deliver blazing access to data.

The x3455 addresses traditional high performance computing application bottlenecks with non-traditional, innovative server architecture. IBM Xcelerated Memory Technology allows six DIMMs per processor to run at 667 MHz, which means faster access for large memory configurations. Also, IBM eXtended I/O technology featuring a choice of I/O slots means greater flexibility for cluster interconnects.

Here are some quick x3455 facts:

- High-performance design to maximize return on your IT investment
- Manage growth and risks of dynamic HPC workloads with this scalable and flexible computing solution
- Go green and save with a new design and tools for optimized power management.

## x3550

Designed for applications ranging from Web serving to workload consolidation and virtualization, the IBM System x3550





## Specifications

Form factor/height	1U rack server
Processor	Quad-Core AMD Opteron Model 2352, 2356, 2360 SE
Number of processors (std/max)	1/2
Cache (max)	2 MB per socket
Memory (std/max)	2 x 1 GB /48 GB PC5300 ECC DDR II SDRAM IBM Chipkill 667 MHz via 12 DIMM slots
Expansion slots	PCI-Express (1) x16 standard; optional (1) x8 or (1) HTx
Disk bays (total)	2
Maximum internal storage	1.5 TB SATA II or 600 GB SAS (3 Gbps)
Network interface	Integrated dual Gigabit Ethernet
Power-total system input requirements	Visit <a href="http://ibm.com/systems/x">ibm.com/systems/x</a> for more on the Power Calculator
Power supply	650W capacity
RAID support	Optional RAID-0, -1 for internal drives using the IBM HBA Controller
Remote systems management	Integrated BMC features serial over LAN (IPMI 2.0-compliant), IBM Director, Cluster Systems Management
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX
Limited warranty	1-year customer replaceable unit and onsite limited warranty

- [x3455 details on PartnerWorld](#)
- [x3455 details on IBM.com](#)
- [x3455 competitive info on COMP](#)

**Figure R.4.** IBM System x3455 at a glance (and links to more detail).

([Figure R.5](#)) offers high-speed, dual-core, and quad-core processors with blazing front-side bus speed. Optimized for exceptional application computing, the x3550 features a highly functional infrastructure that addresses more memory, lowers power consumption, and provides dramatic systems performance increases.

Standard integrated data protection with hardware RAID and 2.5-inch SAS hard disk drives keeps your data safe and readily available. Super-efficient network communication and hot-swap redundant power help keep your business humming at lower support costs.

Fault protection comes integrated in the x3550. IBM Systems Director Active Energy Manager delivers advanced control to help monitor power usage and achieve decreased infrastructure, power, and cooling costs. Hot-swap, redundant fans keep components cool without taking the server offline. Select configurations of the x3550 are part of the IBM Express Advantage Portfolio, designed and priced to meet the needs of midsize businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick x3550 facts:

- High-performance design to maximize your IT investment
- Manage growth and risk for improved business availability with IBM X-Architecture features
- Go green and save with new design and tools for optimized power management.



**Specifications**

Form factor/height	Rack/1U
Processor (max)	Dual-Core Intel Xeon X5270 up to 3.5 GHz and up to 1333 MHz front-side bus or Quad-Core Intel Xeon X5470 up to 3.33 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
L2 cache	2 x 2 or 2 x 6 MB (dual-core) and 2 x 6 MB (quad-core)
Memory (std/max)	1 GB or 32 GB fully buffered DIMM 667 MHz
Expansion slots	2 PCI-Express (x8) half-length, full-height, or optional riser card for 1 PCI-X (64-bit 133 MHz)
Disk bays (total/hot-swap)	2/2 (3.5" form factor) or 4/4 (2.5" form factor)
Maximum internal storage	600 GB 3.5" hot-swap SAS or up to 2.0 TB simple-swap SATA or 293.6 GB 2.5" hot-swap SAS
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	670W 1/2
Hot-swap components	Power supply, fans, hard disk drives (select models)
RAID support	Integrated RAID-0, -1, -10, optional RAID-5, -6
Systems management	IBM Systems Director Active Energy Manager, Integrated Service Processor, Diagnostic LEDs, drop-down light path diagnostics panel, Automatic Server Restart, optional Remote Supervisor Adapter II SlimLine, IBM Systems Director, IBM ServerGuide, and optional Remote Deployment Manager
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Novell NetWare
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [x3550 details on PartnerWorld](#)
- [x3550 details on IBM.com](#)
- [x3550 competitive info on COMP](#)

**Figure R.5.** IBM System x3550 at a glance (and links to more detail).

## x3550 M2

The IBM System x3550 M2 ([Figure R.6](#)) offers robust, proven technology and a flexible, Energy Star-compliant design. Delivering quad-core computing on Intel Xeon 5500 Series processors with QuickPath Interconnect technology, this server delivers significant performance improvement per watt compared to previous generation servers by integrating low-wattage components for an energy-smart thermal profile.

This server offers feature-rich systems management capabilities from power management to proactive hardware monitoring. The Integrated Management Module (IMM) increases server availability by continuously monitoring your system and notifying you of potential system failures or changes. The virtual media key option provides remote presence capabilities without taking up a slot on the planar, while IBM Systems Director Active Energy Manager provides advanced power monitoring and notification.

Designed to provide leadership virtualization, the x3550 M2 supports the VMware ESXi 3.5 embedded hypervisor, the industry-leading solution for virtualization. In addition, the x3550 M2 provides exceptional memory capacity per core, enabling you to implement virtualization efficiently and cost-effectively. Select configurations of the x3550 M2 are part of the IBM Express Advantage Portfolio, designed to meet the needs of midsize businesses.

Here are some quick x3550 M2 highlights:

- Reduce costs with an energy-smart design that provides optimal quad-core computing performance per watt



**Specifications**

Form factor/height	1U rack
Processor (max)	Up to two quad-core Intel Xeon 5500 Series with Intel QuickPath Interconnect (QPI) technology, up to 2.93 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
Cache (max)	Up to 8 MB
Memory (max)	1 GB, 2 GB, 4 GB, or 8 GB DDR-3 RDIMMs with 16 DIMM slots—up to 128 GB maximum memory
Expansion slots	2 PCI-Express x16 Gen 2 slots; one is half-length, full-height and one is low-profile (each slot convertible to PCI-X with riser option)
Disk bays (total/hot-swap)	Up to six (2.5”) hot-swap SAS/SATA or solid-state drives (SSD)
Maximum internal storage	Up to 1.8 TB hot-swap serial attached SCSI (SAS) or up to 1.8 TB hot-swap Serial ATA (SATA) or up to 300 GB hot-swap SSD local storage
Network interface	Gigabit Ethernet (2 ports standard, plus 2 ports optional)
Hot-swap components	Power supplies, fans, HDDs
RAID support	Hardware RAID-0, -1, optional RAID-5
Systems management	IBM IMM with Virtual Media Key, Predictive Failure Analysis, Integrated Service Processor, Diagnostic LEDs, light path diagnostics, Automatic Server Restart, IBM Systems Director Active Energy Manager, IBM ServerGuide
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX

- [x3550 M2 info on PartnerWorld](#)
- [x3550 M2 info on IBM.com](#)
- [x3550 M2 competitive info on COMP](#)

**Figure R.6.** IBM System x3550 M2 at a glance (and links to more detail).

- Improve service with a highly flexible design that is easy to deploy, integrate, and manage
- Manage risk with resilient architectures and virtualized environments.

## x3650

For constrained data center environments, the IBM System x3650 ([Figure R.7](#)) offers unprecedented performance and reliability. Optimized for up to eight-core processor performance, the x3650 delivers rack-dense, dual-core, or quad-core computing power, an impressive 12 DIMM memory design, and super-efficient network communication.

Innovation comes standard on the x3650. Anywhere/anytime management keeps assets under control. IBM Systems Director Active Energy Manager delivers advanced control, monitoring power consumption while achieving decreased cooling costs. The optional RSA II SlimLine card keeps slots free while expanding systems management functionality.

Scalable memory and I/O design satisfy high-speed processing and reliability requirements, while integrated RAID safeguards data. Hot-swap power and cooling with calibrated vectored cooling and IBM Systems Director Active Energy Manager help keep your server cool. The result? Run multiple workloads on a two-socket server—without running out of IT funds. Select configurations of the x3650 are part of the IBM Express Advantage Portfolio designed and priced to meet the needs of midsize businesses. Easy to manage, Express models/configurations vary by country.



**Specifications**

Form factor/height	Rack/2U
Processor (max)	Dual-Core Intel Xeon X5270 up to 3.50 GHz and up to 1333 MHz front-side bus or Quad-Core Intel Xeon X5470 up to 3.33 GHz and up to 1333 MHz front-side bus
Number of processors	1/2
L2 cache	2x2 or 2x6 MB (dual-core) or 2x6 MB (quad-core)
Memory (std/max)	1 GB or 2 GB/48 GB fully buffered DIMM 667 MHz via 12 DIMM slots
Expansion slots	4 PCI-Express or 2 PCI-X and 2 PCI-Express
Disk bays (total)	Six 3.5" or eight 2.5" (SFF)
Maximum internal storage	1.8 TB hot-swap SAS or 6.0 TB hot-swap SATA
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	835W 1/2 AC standard, DC power supply optional
Hot-swap components	Power supply, fans, and hard disk drives
RAID support	Integrated RAID-0, -1, -10, optional RAID-5, -6
Systems management	IBM Systems Director Active Energy Manager, Integrated Service Processor, Diagnostic LEDs, drop-down light path diagnostics panel, Automatic Server Restart, optional Remote Supervisor Adapter II SlimLine, IBM Systems Director, IBM ServerGuide, and optional Remote Deployment Manager
Operating systems	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Novell NetWare, SCO OpenServer and UnixWare, Solaris
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [x3650 details on PartnerWorld](#)
- [x3650 details on IBM.com](#)
- [x3650 competitive info on COMP](#)

**Figure R.7.** IBM System x3650 at a glance (and links to more detail).

Here are some quick x3650 facts:

- Go green and save with new dual-core or energy-efficient quad-core processors and faster memory
- Manage growth and complexity by using new integrated solutions to easily manage your resources
- Protect IT investments with scalable memory, I/O, and storage on a long-life server platform.

## x3650 M2

The IBM System x3650 M2 ([Figure R.8](#)) offers robust, proven technology and a flexible, Energy Star-compliant design. Delivering quad-core computing on Intel Xeon 5500 Series processors with QuickPath Interconnect technology, this server delivers significant performance improvement per watt compared to previous generation servers by integrating low-wattage components for an energy-smart thermal profile.

The x3650 M2 offers feature-rich management capabilities from power management to proactive hardware monitoring. The Integrated Management Module (IMM) increases server availability by continuously monitoring your system and notifying you of potential system failures or changes. The Virtual Media key option provides remote presence capabilities without taking up a slot on the planar, while IBM Systems Director Active Energy Manager delivers advanced power monitoring and notification.

Designed to provide leadership virtualization, the x3650 M2 supports the VMware ESXi 3.5 embedded hypervisor, the industry-leading solution for virtualization. In addition, the





**Specifications**

Form factor/height	2U rack
Processor (max)	Up to 2 quad-core Intel Xeon 5500 Series with Intel QuickPath Interconnect (QPI) technology, up to 2.93 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
Cache (max)	Up to 8 MB
Memory (max)	1 GB, 2 GB, 4 GB, or 8 GB DDR-3 RDIMMs with 16 slots up to 128 GB maximum memory
Expansion slots (I/O)	4 PCI-Express (4x8) Gen 2 slots: 2x8 full-length, full-height; 1x8 half-length, full-height; 1x8 low-profile. 4x8 are convertible to 2x16 via optional risers. Also, 2x PCI-X via optional risers
Disk bays (total/hot-swap)	Up to 12 (2.5") hot-swap SAS/SATA or solid state HDDs
Maximum internal storage	Up to 3.6 TB hot-swap Serial Attached SCSI (SAS) or up to 3.6 TB hot-swap Serial ATA (SATA) or up to 600 GB hot-swap solid state (SSD) local storage
Network interface	Gigabit Ethernet (2 ports standard, plus 2 ports optional)
Hot-swap components	Power supplies, fans, HDDs
RAID support	Hardware RAID-0, -1, optional RAID-5
Systems management	IBM IMM with Virtual Media Key, Predictive Failure Analysis, Integrated Service Processor, Diagnostic LEDs, light path diagnostics, Automatic Server Restart, IBM Systems Director Active Energy Manager, IBM ServerGuide
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX

- [x3650 M2 details on PartnerWorld](#)
- [x3650 M2 details on IBM.com](#)
- [x3650 M2 competitive info on COMP](#)

**Figure R.8.** IBM System x3650 M2 at a glance (and links to more detail).

x3650 M2 provides exceptional memory per core, enabling you to implement virtualization efficiently and cost-effectively. Select configurations of the x3650 M2 are part of the IBM Express Advantage Portfolio, designed to meet the needs of midsize businesses.

Here are some quick x3650 M2 highlights:

- Reduce costs with an energy-smart design that provides optimal computing performance per watt
- Improve service with a flexible design that is easy to deploy, integrate, and manage
- Manage risk with resilient architectures and virtualized environments.

## x3650 T

The IBM System x3650 T ([Figure R.9](#)) takes carrier-grade servers and next-generation networks to new levels. Built especially for network equipment providers and service providers, this powerful NEBS-3/ETSI-compliant server is rich in design and functionality. The x3650 T is equipped with dual, redundant hot-swap DC or AC power supplies for high availability, up to six PCI slots for extreme expandability, and an external alarm panel providing 24/7 surveillance of system outages. The x3650 T features a long production lifecycle, providing businesses investment protection.

Here are some quick x3650 T facts:



### Specifications

Form factor/height	2U rack-optimized
Processor (max)	Up to two Intel Xeon 3.2 GHz/800 MHz front-side bus
Number of processors (std/max)	2/2
Cache (max)	2 MB L2
Memory (max)	16 GB ECC DDR II 400 ECC
Expansion slots	6 maximum
Disk bays (total)	2
Maximum internal storage	293.6 GB Ultra320 SCSI
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	2/2 (DC or AC models)
Hot-swap components	Power supply (same cage for DC/AC power supply)
RAID support	Integrated RAID-0, -1
Systems management	Integrated Intel BMC
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise

- [x3650 T details on PartnerWorld](#)
- [x3650 T details on IBM.com](#)
- [x3650 T competitive info on COMP](#)

**Figure R.9.** IBM System x3650 T at a glance (and links to more detail).

- Delivering superior performance, this carrier-grade, industry-standard Intel processor-based solution is optimized for the telecommunications environment
- Two 3.2 GHz/800 MHz front-side bus Intel Xeon processors provide the engine for high compute environments
- Featuring a 20-inch deep chassis ideal for space-constrained environments, the x3650 T is built especially for network equipment providers and service providers
- First Intel Extended Memory 64 technology-enabled telecommunications rack-mount server.

## x3655

The IBM System x3655 ([Figure R.10](#)) is a low-cost, dual-socket server that is optimized for general-purpose computing. It provides flexibility and scalability while offering multiple levels of price/performance.

The x3655 provides quad-core performance at an entry-level price. With features such as low-cost processors, 16 available DIMMs with up to 64 GB of DDR II memory, and robust I/O, customers can configure to meet their needs.

The x3655 offers low-cost DDR II memory when compared with competitive servers. Also, 16 available DIMMs allow customers to scale memory incrementally as needed, lowering total cost of ownership (TCO) for customers. Several models come standard with lower-cost SATA hard disk drives, further decreasing TCO. IBM Systems Director Active Energy Manager delivers advanced control to help monitor power usage and



### Specifications

Form factor/height	2U
Processor (max)	Quad-Core AMD Opteron Model 2344 HE (1.7 GHz), 2352 (2.1 GHz) or 2356 (2.3 GHz)
Number of processors (std/max)	1/2
Memory (max)	64 GB DDR II 667 MHz via 16 DIMMs
Expansion slots	Standard: 2 PCI-Express x8 (low-profile) and 1 PCI-Express x4 (low-profile); Optional: 1 HTx (full-height/full-length) Riser, 1 PCI-X 133 MHz (full-height/full-length) or 1 PCI-Express x16 (full-height/full-length) Riser
Disk bays (total/hot-swap)	8 SFF (2.5") hot-swap SAS hard disk drives (HDDs) or six 3.5" hot-swap SAS/SATA HDDs
Maximum internal storage	1.8 TB hot-swap SAS or 4.5 TB hot-swap SATA
Network interface	Integrated dual Gigabit Ethernet with TCP/IP Offload Engine (TOE)
Power supply (std/max)	835W 1/2
Hot-swap components	Power supply, hard disk drives, cooling fans
RAID support	RAID-0, -1, -10 standard, RAID-5, -6, -10, -50, -60 and battery backup optional
Systems management	Baseboard Management Controller IPMI 2.0 standard, Remote Supervisor Adapter II SlimLine optional
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [x3655 details on PartnerWorld](#)
- [x3655 details on IBM.com](#)
- [x3655 competitive info on COMP](#)

**Figure R.10.** IBM System x3655 at a glance (and links to more detail).

achieve decreased power and cooling costs. Grow your compute power without growing your data center. Leverage AMD Opteron processor performance and IBM reliability to help improve your competitiveness.

Here are some quick x3655 facts:

- Manage growth and complexity by using new integrated solutions to easily manage your resources
- Improve reliability and mitigate potential risk through optional redundant hardware solutions
- Go green and save through efficient power management, systems management, and deployment.

## Enterprise Servers

In this section, we examine the most powerful System x servers. Here, the focus is on maximizing performance, capacity,

and availability in order to meet mission-critical business needs.

### MORE ON THE WEB

- [Overview of all System x Enterprise Servers](#)

## x3755

The IBM System x3755 ([Figure E.1](#)) provides unmatched price, performance, and energy efficiency with two, three, or four six-core AMD Opteron processors. and IBM's exclusive CPU Pass Thru card. This innovative card delivers near-linear performance and flexible configurations with headroom to grow in one-CPU increments providing real savings while increasing performance.



### Specifications

Form factor/height	4U
Processor (max)	Six-Core AMD Opteron Models 8385 and 8435 (up to 2.6 GHz)
Number of processors (std/max)	2/4
Cache (max)	6 MB L3
Memory (max)	128 GB DDR II 667 MHz
Expansion slots	7 total: 4 PCI-Express (1) x16; (2) x8; (1) x4 and 2 PCI-X (133 MHz/100 MHz); 1 HTx
Disk bays (total/hot-swap)	4/4
Maximum internal storage	1.2 TB (4 x 300 GB)
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	1500W (1/2)
Hot-swap components	Power supply, HDDs, cooling fans
RAID support	Integrated RAID-0, -1, -10, RAID-5 optional
Systems management	Baseboard Management Controller IPMI 2.0 standard, optional RSA II SlimLine
Operating systems supported	Microsoft Windows 2008 (32-bit/64-bit), Microsoft Windows 2003 (32-bit/64-bit), Red Hat Enterprise Linux 5.0, SUSE Linux Enterprise Server 10.0
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [x3755 details on PartnerWorld](#)
- [x3755 details on IBM.com](#)
- [x3755 competitive info on COMP](#)



**Figure E.1.** IBM System x3755 at a glance (and links to more detail).

The x3755, using IBM's exclusive Xcelerated Memory Technology, is the only AMD Opteron processor-based four-socket server capable of running fully populated memory at the maximum 667 MHz. Competitive systems are forced to clock memory speed back to 533 MHz with fully populated DIMMs. The x3755 provides outstanding memory price performance for general purpose computing environments, mission-critical business applications, and virtualized environments.

Features such as the pull-down light path diagnostics panel and IBM predictive failure analysis allow quick and easy identification of component failures, helping to maximize uptime. With light path diagnostics for major components such as hard disk drives, memory, and CPU, along with fans, voltage regulator modules, and power supplies, the x3755 delivers a full set of alerts to help keep your system running at maximum efficiency.

Here are some quick x3755 facts:

- The industry's only AMD Opteron processor-based system capable of a three processor configuration, delivering outstanding performance at a lower cost
- Outstanding leadership with IBM Xcelerated Memory Technology
- Deliver superb performance per watt with this cost-effective solution.

## x3850 M2

Built on the next generation of IBM X-Architecture servers, the IBM System x3850 M2 ([Figure E.2](#)) takes performance,





**Specifications**

Form factor/height	Rack/4U per chassis
Processor (max)	Intel Xeon Series 7400 up to 2.66 GHz (6 core)/1066 MHz front-side bus
Number of processors (std/max)	2/4 per chassis (optional 2, 3, 4 chassis support)
Cache (max)	Up to 16 MB
Memory (max)	4 GB or 8 GB/256 GB max PC2-5300 DDR II
Expansion slots	7 total PCI-Express half length, (2 hot-plug)
Disk bays (total/hot-swap)	4/4 2.5" Serial Attached SCSI (SAS)
Maximum internal storage	587 GB SAS per chassis (supports 73.4 GB and 146.8 GB hard disk drives)
Network interface	Integrated dual Gigabit Ethernet w/TCP-IP off-load engine
Power supply (std/max)	1440W 220V 2/2
Hot-swap components	Power supplies, fans, memory, hard disk drives, and PCI-Express adapters
RAID support	Integrated RAID-0, -1, optional RAID-5
Systems management	Alert on LAN 2, Automatic Server Restart, IBM Director, IBM ServerGuide, Remote Supervisor Adapter II SlimLine, light path diagnostics (independently powered), Predictive Failure Analysis on hard disk drives, processors, VRMs, fans and memory, Wake on LAN, Dynamic System Analysis (DSA)
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Solaris
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [x3850 M2 details on PartnerWorld](#)
- [x3850 M2 details on IBM.com](#)
- [x3850 M2 competitive info on COMP](#)

**Figure E.2.** IBM System x3850 M2 at a glance (and links to more detail).

efficiency, and reliability to the next level. Featuring an unmatched combination of x86 performance and scalability with a balanced design, the x3850 M2 delivers unrivaled reliability, providing confidence in your IT solution deployments. An easy upgrade path provides the necessary flexibility to deliver an optimized solution for scaleup database, enterprise applications, and server consolidation through virtualization services.

The x3850 M2 is a traditional four-socket server that provides organizations an uncomplicated, cost-effective option—yet easily accommodates growing businesses that require increased application performance. The ScaleXpander Option kit delivers the ability to scale from four sockets to eight sockets and up to 16 sockets with the flexible XpandOnDemand design; it's a pay-as-you-grow offering that provides more flexibility than the previous x3850, so organizations have even more control over IT costs. And the system's balanced design enables organizations to operate efficiently and save money on initial server configurations without having to make up-front decisions about scalability and long-term protection of their IT investments. When clients add a second chassis, the x3850 M2 doubles the memory availability and I/O capability and nearly doubles processing power.

Here are some quick x3850 M2 facts:

- Outstanding commercial application serving and database performance
- Balanced system design supports more applications and helps clients manage expanding business needs

- Mission-critical availability helps prevent interruptions in day-to-day enterprise operations
- High-bandwidth, low-latency memory subsystem built on DDR II registered DIMM technology
- Go green and save through server memory technology using less power and new, high-efficiency power supplies.

## x3950 M2

Engineered with the needs of enterprise organizations in mind, the IBM x3950 M2 ([Figure E.3](#)) provides a scalable, efficient, and highly reliable solution. This 4th generation X-Architecture enterprise server combines 64-bit performance in a balanced design. The x3950 M2 can help organizations meet business demands with confidence, and since many organizations require servers that expand as business grows, the x3950 M2 provides the flexibility to run more applications on the same piece of hardware. These features deliver an optimized solution for large database enterprise applications and virtualization services.

The x3950 M2 provides an uncomplicated, cost-effective, and highly flexible solution. With the ability to scale up to a maximum of 96 cores using Intel six-core processors, while maintaining balanced performance between processors, memory, and I/O, the x3950 M2 can easily accommodate business expansion and the resulting need for additional application space. Unique flexibility of the configurations allows the system to populate a minimum of two CPUs per chassis for additional access to memory and I/O that addresses an



### Specifications

Form factor	Rack/4U per chassis
Processor	Intel Xeon Processor 7400 series up to 2.66 GHz (six cores)/ 1066 MHz front-side bus
Number of processors (std/max)	2/4 per chassis (optional 2, 3, 4 chassis support)
Cache (max)	Up to 16 MB
Memory (max)	4 GB or 8 GB/256 GB max PC2-5300 DDR II
Expansion slots	7 total PCI-Express half-length, (2 active PCI-Express)
Disk bays (total/hot-swap)	4/4 2.5" serial attached SCSI (SAS)
Maximum internal storage	587 GB SAS per chassis (supports 73.4 GB and 146.8 GB hard disk drives)
Network interface	Integrated dual Gigabit Ethernet with TCP-IP Offload Engine
Power supply (std/max)	1440W 220V 2/2
Hot-swap components	Power supplies, fans, memory, HDDs and PCI-Express adapters
RAID support	Integrated RAID-0, -1, optional RAID 5
Systems management	Alert on LAN 2, Automatic Server Restart, IBM Director, IBM ServerGuide, Remote Supervisor Adapter II SlimLine, light path diagnostics (independently powered), Predictive Failure Analysis on hard disk drives, processors, VRMs, fans and memory, Wake on LAN, Dynamic System Analysis (DSA)
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Solaris
Limited Warranty	3-year customer replaceable unit and onsite limited warranty

- [x3950 M2 details on PartnerWorld](#)
- [x3950 M2 details on IBM.com](#)
- [x3950 M2 competitive info on COMP](#)

**Figure E.3.** IBM System x3950 M2 at a glance (and links to more detail).

organization's specific application requirements. This flexibility allows for the creation of a 12-core, 32-DIMM server utilizing only two processor sockets for processor licensing-constrained applications, and can be scaled to a 48-core, 128-DIMM server utilizing only eight processors.

Here are some quick x3950 M2 facts:

- Scalable solution delivers outstanding performance for realizing business demands with an easy pay-as-you-grow design
- Balanced design provides additional memory, processing power, and I/O on demand
- Consistent, reliable performance delivers advanced data protection to help manage your risk.

## iDataPlex/Cluster Servers

Here we will explore the iDataPlex and System x Clusters used for Internet-scale and high performance computing.

### iDataPlex

For Internet-scale computing, iDataPlex Intel Xeon processor-based servers help pack more processors into the same power and cooling envelope, better utilizing floor space, and creating the right-size data center design.

The innovation embodied in the iDataPlex product line has been widely recognized. Here are just two examples:

- Top 10 Product Innovation of the Year 2008—*eWeek*

## MORE ON THE WEB

- [Overview of iDataPlex Servers](#)
- [Linux Magazine Article on iDataPlex](#)



*Multiple iDataPlex Videos*

- Winner of the SuperComputing 2008 Cluster Challenge with Indiana University

### *iDataPlex dx360 M2*

Designed for data centers that require high performance, yet are constrained on floor space and power and cooling infrastructure, the IBM System x iDataPlex dx360 M2 ([Figure I.1](#)) provides an innovative, half-depth solution optimized for maximum density and incredible efficiency. Featuring the latest Intel Xeon Processor 5500 series and DDR-3 memory, the dx360 M2 is easy to manage and delivers outstanding performance in a flexible platform that can be tailored to your data center's processing, storage, or I/O needs.

For high-performance computing, the dx360 M2 allows you to pack more processors into the same power and cooling envelope as traditional servers, better utilizing floor space and optimizing the data center. The flexible design of the dx360 M2 enables the right compute, storage, or I/O capabilities required in your data center.

The innovative, half-depth form factor of the dx360 M2 reduces the airflow required across the components, lowering



**Specifications**

Form factor/height	Half-depth, 2U Flex chassis or 3U storage chassis
Processor (max)	Intel Xeon 5500 series quad-core up to 2.93 GHz
Number of processors (std/max)	2
Cache (max)	4 MB to 8 MB
Memory (max)	Up to 64 GB DDR-3 1333 MHz via 16 DIMM slots
Expansion slots	1 slot PCI-Express x16 electrical/x16 mech (Gen 2), 2 x8 PCI-Express
Disk bays (total/hot-swap)	Up to five 3.5" (2U) or 12 3.5" (3U storage density)
Maximum internal storage	12.0 TB (3U storage chassis)
Network interface	Integrated dual Gigabit Ethernet plus configurable dedicated management port—optional I/O adapters for 10 Gigabit Ethernet, InfiniBand DDR
Power supply (std/max)	1 slot PCI-Express x16 electrical/x16 mech (Gen 2), 2 x8 PCI-Express
Hot-swap components	Hot-swap HDDs in 3U storage dense configuration
RAID support	Integrated RAID-0, -1, optional RAID-5, -6, -10 via optional I/O controller
Systems management	IBM Systems Director including IBM Systems Director Active Energy Manager, Integrated Management Module (IMM) with optional remote KVM support
Operating systems supported	Red Hat Enterprise Linux 5, Red Hat Enterprise Linux 4, SUSE Linux Enterprise Server 10, Microsoft Windows Server 2008 including HPC Edition, Microsoft Windows Server 2003 R2 including Microsoft Windows Compute Cluster Edition

- [dx360 M2 details on PartnerWorld](#)
- [dx360 M2 details on IBM.com](#)
- [iDataPlex Sales Kit](#)
- [iDataPlex details on IBM.com](#)
- [iDataPlex competitive info on COMP](#)

**Figure I.1.** IBM iDataPlex dx360 M2 at a glance (and links to more detail).

the power needed for cooling. High-efficiency power supplies, larger better-optimized fans in the 2U chassis, and power management capabilities provide further efficiencies to minimize the dx360 M2's power requirements.

The dx360 M2 is simple to manage on a server level or at a rack level as part of an iDataPlex rack. IBM ToolsCenter provides common management across all System x servers, making the dx360 M2 easy to incorporate into your data center.

## System x Cluster

IBM's System x clusters ([Figure I.2](#)) span the broad portfolio of highly innovative IBM System x servers (System x rack servers, BladeCenter Blade Servers, and iDataPlex servers) with industry-leading OEM interconnects to deliver HPC (high performance computing) solutions that increase customer value through reduced costs, improved service, and managed risk.

Our HPC clusters can be deployed on either Linux or Microsoft Windows network operating systems and are designed to optimize performance supporting a broad range of application environments, including industrial design and manufacturing, financial services, life sciences, government, and education.

IBM has extensive experience and is a world leader with HPC clusters, as demonstrated by our continued leadership in

### MORE ON THE WEB

- [HPC clustering sales kit](#)
- [IBM System Cluster 1350](#)

the Top 500 Supercomputers list published twice per year. Our HPC clusters are thoroughly tested in IBM engineering and test laboratories for integrated cluster func-





**Specifications**

Systems	Blade servers: HS21, HS21 XM, HS22, LS21, LS22, LS41, LS42, JS22, QS22 Rack servers: x3450, x3455, x3550, x3550 M2, x3650, x3650 M2, x3655, x3755 iDataPlex servers: dx320, dx340, dx360, dx360 M2
Interconnects	Ethernet switches: 1 Gigabit (BNT) BLADE Network Technologies, Cisco, Force10, SMC Ethernet NIC—10 Gigabit Chelsio InfiniBand Voltaire, QLogic, Mellanox Fibre Channel Brocade QLogic, Emulex
Storage servers	System Storage DS4800, DS4700, DS4200, DS3400, DS3200, EXP3000
Storage expansion	EXP810 Storage Expansion Unit EXP420 Storage Expansion Unit EXP3000SAS JBOD, Single ESM
SAN switches	IBM System Storage SAN24B-4 Express IBM System Storage SAN40B-4
Operating system	Red Hat Enterprise Linux 5, SUSE Linux Enterprise Server 10, Microsoft Windows HPC Server 2008

- [1350 Cluster details on PartnerWorld](#)
- [1350 Cluster details on IBM.com](#)
- [1350 Cluster competitive info on COMP](#)

**Figure I.2.** IBM System Cluster 1350 at a glance (and links to more detail).

tionality. Our clients benefit by realizing minimized risk and complexity.

IBM is currently working with Microsoft's HPC Server 2008, a high performance computing cluster operating system from Microsoft, to enable our Partners to sell/assemble/implement this operating system on IBM clusters.

# 4

## BladeCenter Product Quick Reference

In this chapter, we explore the IBM BladeCenter products and guide you to resources that will help you succeed.

### What Is a BladeCenter Blade Server?

The term “blade server” refers to a thin, ultra dense enclosure that houses microprocessors, memory, disk storage, networking, and other functions. Multiple blade servers are inserted into a standardized, rack-mounted, mechanical box called a “chassis” like books into a bookshelf. The resulting computer system is called a BladeCenter. The chassis is equipped with inter-connecting midplanes (which provide the electrical connection between blades) and redundant components to achieve increased density, reduced electrical power requirements, higher reliability, and lower costs as compared with other servers. Systems management soft-

#### MORE ON THE WEB

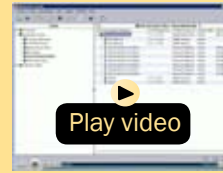
- [Overview of BladeCenter servers](#)
- [Info on Blade.org](#)



*IBM BladeCenter:  
The right choice*

**MORE ON THE WEB**

*IBM BladeCenter  
Video Library*



*IBM BladeCenter  
Configuration Manager  
Demo (4:46)*

ware helps with deployment, reprovisioning, updating, troubleshooting, etc., for local or remote configurations consisting of hundreds of server blades. Collectively, these characteristics are making the BladeCenter concept very popular in the marketplace.

The blade servers offered by IBM fall under the IBM BladeCenter name. BladeCenter is a broad platform that allows users to integrate and centrally manage a collection of servers, storage devices, and networking functions that collectively provide more computing power at a lower cost and in a smaller space (i.e., smaller footprint) than traditional server “box” approaches. To achieve this, BladeCenter uses a modular design packaged in high-density rack enclosures that employ techniques that enable using more powerful microprocessors. You can quickly respond to changing workloads by re-purposing existing server blades or installing additional server blades in a “pay-as-you-grow” fashion.

IBM BladeCenter can help you implement new applications and functions affordably to address more and better business opportunities. With easily integrated IBM products providing

a highly secure and robust platform for information sharing, you can more easily attain a collaborative working environment, keep your business up and running, and attain high levels of business resiliency.

BladeCenter servers have four elements:

- *Chassis*—The mechanical enclosure that holds everything else, including various optional modules that fit into bays in the chassis to provide additional function. The chassis is designed to be installed in a rack.
- *Modules*—Components that are installed in hot-swap module bays provided in the BladeCenter chassis. These modules provide a number of common functions needed by the installed blades, the chassis, and the other modules. Modules include things like power supplies, systems management modules, cooling fans, and network switches. IBM has published the specifications for the BladeCenter modules and options. This should result in a greater variety of options from a wider range of vendors than before.
- *Blade servers*—Processors, memory, and other circuitry packaged on a card that is installed in the chassis. The server blades used in BladeCenter are of three basic types: Intel/AMD processor-based, IBM POWER microprocessor-based, or Cell Broadband Engine-based.
- *Expansion options*—Cards installed in the blades that add function like additional network Ethernet attachments, fibre channel attachment, etc.

## Chassis

In this section, we look at the chassis for the basic mechanical structure of a BladeCenter server.

### BladeCenter S Chassis

The IBM BladeCenter S ([Figure C.1](#)) is the industry's first blade chassis uniquely designed for small and midsize offices and distributed environments. Building in simplicity and economy, BladeCenter S is designed to get big IT results from the smallest IT staffs.

Small enough to sit under your desk, the new BladeCenter S chassis makes it easy and cost effective for small and midsize businesses to obtain IT results at levels traditionally reserved for large enterprises. With six blade servers and shared storage capability, the chassis simply plugs into an average wall socket, helping eliminate the need to own and operate costly data centers. Within a single chassis, BladeCenter S supports virtually all of your applications, including those running on Microsoft Windows, IBM AIX, IBM i, and Linux—and integrates the hardware and software most used by midsize businesses.

BladeCenter S is compatible with the BladeCenter family of products, helping provide investment protection and seamless growth. The new chassis shares many of the IBM BladeCenter blades and switches. Leveraging a single, compatible architecture can help you reduce costs and complexity, while helping deliver investment protection.

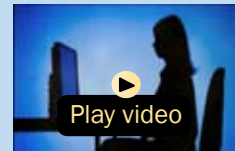
Here are some quick BladeCenter S chassis facts:



**Specifications**

Form factor	Rack/7U incorporates blade server bays and hot-swap storage high-availability midplane
Blade bays	Up to 6
Disk bays	Up to 2 disk storage modules that can incorporate six 3.5" SAS or SATA disks each
Standard media	CD-RW/DVD-ROM combo accessible from each blade server
Switch modules	4 switch module bays
Power supply module	Up to 4 (hot-swap and redundant 950W/1450W with loadbalancing, auto-sensing, and failover capabilities)
Cooling modules	4 hot-swap and redundant blowers standard
Systems management hardware	1 management module standard
I/O ports	Keyboard, video, mouse, Ethernet, USB
Systems management software	Open and easy systems management and deployment tools
Predictive failure analysis	Hard disk drives, processors, blowers, memory
Light path diagnostics	Blade server, processor, memory, power supplies, blowers, switch module, management module, hard disk drives, and expansion card
Limited warranty	3-year customer replaceable unit and onsite limited warranty
Integrated storage	Support for hot-swap SAS or hot-swap SATA disks that can either be individually zoned or shared across all blades
External storage	Support for IBM System Storage solutions (including DS and NAS family of products) and many widely adopted non-IBM storage offerings

- [BladeCenter S chassis details on PartnerWorld](#)
- [BladeCenter S chassis details on IBM.com](#)
- [BladeCenter S chassis competitive info on COMP](#)



**Figure C.1.** IBM BladeCenter S chassis at a glance (and links to more detail).

- All in one—integrates servers, storage, networking, and I/O into a single chassis.
- No special wiring needed—uses standard office power plugs with 100-240V.
- Flexible modular technology—integrates a family of IBM blade servers supporting a wide range of operating systems and applications.
- Easy to deploy, use, and manage—allows you to focus on your business, not your IT.
- Helps build greener IT infrastructures—IBM Cool Blue technology delivers a portfolio of tools that helps plan, manage, and control power and cooling.

## BladeCenter E Chassis

IBM BladeCenter E ([Figure C.2](#)) delivers a powerful platform to meet these requirements; it integrates servers, storage, networking, and applications so organizations can build robust IT infrastructures. The result is a data center packed with more operating horsepower that leaves a small carbon footprint.

With its best-in-class energy-efficient design, BladeCenter E enables organizations to reduce power consumption without compromising processing performance. In fact, the system is up to 11 percent more efficient in power and cooling compared to the HP c-Class chassis to run the same configuration in the data center. With these power savings, an organization





### Specifications

Form factor/height	Rack-mount chassis/7U
Blade bays	Up to 14
Switch modules	4 switch module bays
Power supply module	Up to 4 2000 W or 2320 W (hot-swap and redundant with load-balancing and failover capabilities)
Cooling modules	2 hot-swap and redundant blowers standard
Standard media	DVD multi-burner (also available as a CTO option)
Systems management hardware	1 Advanced Management Module standard; add an optional second module for redundancy
I/O ports	Keyboard, video, mouse, Ethernet, USB
Systems management software	Open and easy systems management and trial deployment tools
Light path diagnostics	Blade server, processor, memory, power supplies, blowers, switch module, management module, HDDs, and expansion card
Limited warranty	3-year customer replaceable unit and onsite limited warranty
External storage	Support for IBM System Storage solutions (including DS and Network Attached Storage (NAS) family of products) and many widely adopted non-IBM storage offerings

- [BladeCenter E chassis details on PartnerWorld](#)
- [BladeCenter E chassis details on IBM.com](#)
- [BladeCenter E chassis Announcement Letter, Feb 06](#)
- [BladeCenter E chassis competitive info on COMP](#)

**Figure C.2.** IBM BladeCenter E chassis at a glance (and links to more detail).

can operate at full potential with lower energy costs—and can go green and save.

Here are some fast BladeCenter E facts:

- Maximizes productivity and minimizes power usage through energy-efficient design and innovative features
- Delivers extreme density and integration to ease data center space constraints
- Protects an organization's IT investment through IBM BladeCenter family longevity, compatibility, and innovation leadership in blades
- Supports the latest generation of IBM BladeCenter blades, providing investment protection
- Choice of 2000 W or 2320 W power supply to meet your IT infrastructure needs.

## BladeCenter H Chassis

The powerful BladeCenter H ([Figure C.3](#)) is a powerful platform built with the enterprise customer in mind. With IBM BladeCenter Open Fabric Manager, BladeCenter H can help organizations run applications even more efficiently by delivering a flexible, open, and connected infrastructure.

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.



**Specifications**

Form factor/height	Rack-mount chassis/9U
Blade bays	Up to 14
Switch modules	Up to 4 traditional, up to 4 high-speed, and up to 4 bridge module bays
Power supply module	Up to 4 hot-swap and redundant 2900W AC with load balancing and failover capabilities. Operating at 200-240V
Cooling modules	2 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 multi-burner
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	3-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

- [BladeCenter H chassis details on PartnerWorld](#)
- [BladeCenter H chassis details on IBM.com](#)
- [BladeCenter H chassis competitive info on COMP](#)

**Figure C.3.** IBM BladeCenter H chassis at a glance (and links to more detail).

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.

Here are some fast BladeCenter H facts:

- Delivers high performance to run the most demanding applications and simulations at blazing-fast speeds
- Provides easy integration to promote innovation and help manage growth, complexity, and risk
- Protects your investment by being compatible with the entire IBM BladeCenter family.

## BladeCenter T Chassis

Designed to satisfy the rugged demands of the telecom industry, the BladeCenter T is NEBS 3/ETSI-compliant, compact, tough, flexible, and proven to meet the most stringent industry standards and testing ([Figure C.4](#)).

BladeCenter T transforms the way telecommunication services and products are created, deployed, operated, and maintained. It marries the power, agility, innovation, and cost structures of enterprise computing with the ruggedness and reliability demands of the telecom marketplace to launch the new era of on demand, next-generation communications.

Here are some quick BladeCenter T chassis facts:



- [BladeCenter T chassis details on PartnerWorld](#)
- [BladeCenter T chassis details on IBM.com](#)
- [BladeCenter T chassis competitive info on COMP](#)

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**Figure C.4.** IBM BladeCenter T chassis (and links to more detail).

- A commercial off-the-shelf platform designed to help lower total cost of ownership and help accelerate new revenue generation opportunities for telecommunications and service providers
- Innovative, modular design delivers the reliability, flexibility, and performance density capable of supporting an IP-based, next-generation network application infrastructure integrating voice, data, and multimedia

- Integration of servers, I/O, storage, operating systems, and applications into a single, compact network platform that is ideal for deploying autonomic capabilities, enabling an on demand operating environment.

## BladeCenter HT Chassis

IBM BladeCenter HT ([Figure C.5](#)) is a telecommunications-optimized version of IBM BladeCenter H. It delivers out-



- [BladeCenter HT chassis details on PartnerWorld](#)
- [BladeCenter HT chassis details on IBM.com](#)
- [BladeCenter HT chassis competitive info on COMP](#)

**Figure C.5.** IBM BladeCenter HT chassis (and links to more detail).

standing core telecom network performance and high-speed connectivity (more than 1.2 Tbps of aggregate throughput on the backplane) to the BladeCenter family. It is uniquely designed to support end-to-end, next-generation-network (NGN) applications, spanning the control, transport, and services planes for telecommunications equipment manufacturers and service providers.

Here are some quick BladeCenter HT chassis facts:

- With a design that delivers investment protection, IBM BladeCenter HT integrates the server blades, switches, networking, storage, I/O, and management platforms that are supported across the BladeCenter family
- Helps reduce network infrastructure costs with an open, standards-based, commercial off-the-shelf (COTS) platform supporting a large portfolio of world-class, next-generation network (NGN) solutions and applications
- Increases network infrastructure performance with dual-core and quad-core Intel, AMD, and IBM POWER processor blades
- Dramatically increases high-speed connectivity and throughput with multi-terabit networking (more than 1.2 Tbps throughput on backplane) and 40 Gbps per blade server
- Improves network flexibility and interoperability bridging new services to control gateways supporting SS7, VoIP, legacy PSTN, WAN devices, and network interfaces with special purpose telecommunications blades

- Efficiently consolidates network resources while delivering high scalability for NGN applications such as IPTV, VoD, and IMS, with higher port concentrations and 10 Gbps Ethernet network bandwidth
- Supports numerous operating systems and applications, including Linux, Windows, AIX, and Sun Solaris 10—allowing you to choose the ones that best suit your needs in a single platform
- Certified testing by Underwriters Laboratories (UL) of the BladeCenter HT chassis is in progress, and when complete the BladeCenter HT chassis will be covered under a UL-certified NEBS Level 3/ETSI test report, which will be available for review with customers
- Management tools integrated into BladeCenter help simplify administration and maximize the efficiency of network management staffs to help lower costs and improve control of the central office and/or data center (IBM Director)
- Increases flexibility and choice with a single family of compatible systems, designed for deployment in a telecom central office and/or data center environment.

## Blade Servers

Here we look at the different types of server blades that can be used in BladeCenter which can be divided into three groups:

- x86 Blades—Intel Xeon and AMD Opteron blades



- POWER blades
- Cell/B.E. blades.

## x86 Blades

These blade servers are based on x86 processors by Intel (those with an “HS” prefix) and AMD processors (those with an “LS” prefix).

### HS12

The IBM BladeCenter HS12 ([Figure H.1](#)) is a uniprocessor blade that offers the same uptime and availability features as dual-processor servers—at a lower price.

The HS12 combines power and easy integration to offer a flexible, low-cost option for small businesses, a wide choice of processors, and the same availability features found on dual-processor servers—so organizations can run their IT without investing in a data center.

The HS12 gets organizations up and running with minimal downtime. With the same management and I/O as the BladeCenter family, the HS12 is as richly featured as a two-socket server for non-multi-threaded applications.

The HS12 helps reduce energy costs with smaller components and an efficient design, and represents an energy-efficient solution when integrated into the BladeCenter E chassis. Select configurations of the HS12 blade are part of the IBM Express Portfolio, designed and priced to meet the needs of midsize businesses. Reliable and easy to manage, Express models/configurations vary by country.



### Specifications

Processor (max)	Single- or Dual-Core Intel Xeon up to 2.13 GHz or Quad-Core Intel Xeon; up to 2.83 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/1
Cache (max)	Up to 4 MB L2 shared (dual-core) or 2x6 MB L2 (quad-core)
Memory (max)	24 GB
Internal hard disk drives	Choice of hot-swap solid-state, hot-swap SAS, or non-hot-swap SATA HDDs, (support for up to three hot-swap SAS drives with optional storage and I/O blade)
Maximum internal storage	293.6 GB
Network interface	Dual Gigabit Ethernet, up to 8 ports optional
I/O upgrade	1 PCI-Express expansion card connection and 1 PCI-Express high-speed connection
RAID support	Integrated RAID-0 or -1 standard on hot-swap models; optional hardware RAID-5 to protect critical data (via SIO)
Systems management	Integrated system management processor (BMC); UpdateXpress, Remote Deployment Manager, IBM Director, IBM Systems Director Active Energy Manager, ServerGuide 7.x, Scripting Toolkit 1.x
Operating systems supported	Red Hat Linux, SUSE Linux, Microsoft Windows Server, Windows Small Business Server, IBM OS 4690, and SUN Solaris 10
Limited warranty	1-year or 3-year customer replaceable unit and onsite limited warranty

- [HS12 details on PartnerWorld](#)
- [HS12 details on IBM.com](#)
- [HS12 competitive info on COMP](#)



**Figure H.1.** IBM BladeCenter HS12 at a glance (and links to more detail).

Here are some quick HS12 facts:

- Provides similar performance, integration, and reliability as dual-processor servers, at a more affordable price point
- Deploys quickly and manages tasks with no loss of uptime
- Helps reduce power and cooling costs to boost data center efficiency.

## HS21

IBM BladeCenter HS21 ([Figure H.2](#)) is simple to install and maintain, integrates into all BladeCenter chassis at power-efficient envelopes, and offers key features for fewer maintenance problems. Offering low-voltage processors, the HS21 delivers solid performance while helping to minimize power and cooling costs. Organizations can operate more efficiently—and go green and save.

Easily deployed and managed, the HS21 blade empowers organizations to function with more control and higher efficiency—a reliable solution for enterprise environments. IBM continues its legacy of innovation with blade.org, a community of vendors collaborating on new development. Blade.org creates a dynamic for better development of products—like the HS21.

Here are some quick HS21 facts:

- Fast, easy installation and maintenance to help protect your IT investment
- Integrates well into any chassis for enhanced flexibility



### Specifications

Processor (max)	Dual-Core Intel Xeon up to 3.0 GHz or Quad-Core Intel Xeon up to 3.33 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
Cache (max)	6 MB L2 shared (dual-core) or 2 x 6 MB L2 (quad-core)
Memory (max)	Up to 32 GB with fully buffered DIMMs (internal) and up to 64 GB with memory and I/O expansion unit
Internal hard disk drives	2 small form factor (SFF) SAS hard disk drives (HDDs) installed on each blade; or 2 optional internal solid state drives; support for up to 3 additional hot-swap SAS drives with optional storage and I/O blade
Maximum internal storage	600 GB (1.5 TB with SIO)
Network interface	Dual Gigabit Ethernet (TOE capable), up to 8 ports optional
I/O upgrade	1 PCI-X expansion card connection (traditional) and 1 PCI-Express (high-speed)
RAID support	Integrated RAID-0 or -1 standard, integrated RAID-1E or RAID-5 optional with storage and I/O blade
Systems management	Integrated systems management processor
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Solaris
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [HS21 details on PartnerWorld](#)
- [HS21 details on IBM.com](#)
- [HS21 competitive info on COMP](#)

**Figure H.2.** IBM BladeCenter HS21 at a glance (and links to more detail).

- Helps reduce power and cooling costs without sacrificing performance.

## HS21 XM

The IBM BladeCenter HS21 XM ([Figure H.3](#)) delivers optimal performance for enterprise environments with expanded memory and processor performance. This high-density blade server is supported in all IBM BladeCenter chassis and features low-voltage processors for better energy management. Featuring solid state drives and low-voltage processors, the HS21 XM is an energy-efficient solution, enabling organizations to go green and save for better TCO.

Migrating from rack to blade servers enables organizations to simplify their systems and reduce footprints. Comparable processing and memory attributes help keep organizations running smoothly with minimal business interruption.

Here are some quick HS21 XM facts:

- Expanded memory and new lower voltage processors enable more powerful blade performance
- Cool, “green” solution to help reduce energy costs
- Ideal rack-to-blade conversion for optimized efficiency.

## HS22

The IBM BladeCenter HS22 ([Figure H.4](#)) offers flexible options to support a broad range of workloads, including virtualization and enterprise applications. Along with intuitive UEFI-based tools, the HS22 can be customized and deployed quickly while



### Specifications

Processor (max)	Dual-Core Intel Xeon up to 3.00 GHz or Quad-Core Intel Xeon up to 3.0 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
Cache (max)	6 MB L2 shared (dual-core) or 2 x 6 MB L2 (12 MB) (quad-core)
Memory (max)	Up to 32 GB with fully buffered DIMMs
Internal hard disk drives	1 small form factor (SFF) SAS hard disk drive (HDD) installed on each blade; or up to 2 optional internal solid state drives; 1 optional IBM 8 GB Module Flash Drive; support for up to 3 additional hot-swap SAS drives with optional storage and I/O blade
Maximum internal storage	300 GB (1.2 TB with SIO)
Network interface	Dual Gigabit Ethernet (TOE capable), up to 12 ports optional with SIO blade and MSIM card
I/O upgrade	1 PCI-X expansion card connection (traditional) and 1 PCI-Express (high-speed)
RAID support	Integrated RAID-0 or -1 standard on blade server, integrated RAID-1E or RAID-5 optional with SIO Blade
Systems management	Integrated systems management processor
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Solaris
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [HS21 XM details on PartnerWorld](#)
- [HS21 XM details on IBM.com](#)
- [HS21 XM competitive info on COMP](#)

**Figure H.3.** IBM BladeCenter HS21 XM at a glance (and links to more detail).



**Specifications**

Form factor	Single-wide (30 mm)
Processor (max)	Choice of two Intel Xeon 5500 series processors, up to 2.93 GHz
Number of processors (std/max)	1/2
Cache (max)	8 MB (4C)
Memory (max)	12 DDR-3 VLP DIMM slots (up to 96 GB of total memory capacity and memory speeds up to 1333 MHz)
Expansion slots	1 CIOv slot (standard PCI-Express daughter card) and 1 CFFh slot (high-speed PCI-Express daughter card) for a total of 8 ports of I/O to each blade, including 4 ports of high-speed I/O
Disk bays (total/hot-swap)	2 hot-swap bays supporting SAS or SATA HDDs
Maximum internal storage	Up to 600 GB total internal storage
Network interface	Broadcom 5709S onboard NIC with dual Gigabit Ethernet ports with TOE
Hot-swap components	Internal storage bays
RAID support	RAID-0, -1 and -1E (optional RAID-5 with battery-backed cache)
Systems management	Unified Extensible Firmware Interface (UEFI), IBM Integrated Management Module (IMM), Predictive Failure Analysis, optional embedded hypervisor for virtualization, IBM Systems Director Active Energy Manager, light path diagnostics, IBM Systems Director, and IBM ServerGuide
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Server, SUSE Linux Enterprise, VMware ESX, Solaris

- [HS22 details on PartnerWorld](#)
- [HS22 details on IBM.com](#)
- [HS22 competitive info on COMP](#)

**Figure H.4.** IBM BladeCenter HS22 at a glance (and links to more detail).

best-in-class reliability features help keep you up and running. Mix and match the HS22 with the industry's most diverse set of chassis and blades that go beyond x86.

The HS22 provides outstanding performance with support for the latest Intel Xeon processors, high-speed I/O, and support for high memory capacity and fast memory throughput. The HS22 can run applications up to twice as fast compared to previous generation blades. In fact, you can run many applications faster than even competitor four-socket blades.

The HS22 features an innovative mechanical design optimized for cooling capability to help keep the blade running smoothly even under demanding conditions. Combined with low-voltage components, the industry's most energy-efficient chassis, and robust power management tools, the HS22 helps control power consumption and maximize efficiency.

Here are some quick HS22 facts:

- Improve service with unparalleled RAS features and innovative management
- Reduce costs through increased performance, utilization, and efficiency
- Manage growth and reduce risk on a BladeCenter platform with proven stability.

## LS22

The IBM BladeCenter LS22 blade server ([Figure L.1](#)) is a two-socket blade server delivering high performance for memory-intensive applications. For even greater performance and





**Specifications**

Processor (max)	Latest Six-Core AMD Opteron processor 2000-series, including standard power and high-efficiency models
Number of processors (std/max)	1/2
Cache (max)	Up to 6 MB shared
Memory (max)	Up to 64 GB DDR II VLP (up to 800 MHz)
Internal storage	Up to two SAS or solid-state HDDs installed on each blade (support for up to 3 hot-swap SAS drives with optional storage and I/O expansion blade)
Maximum internal storage	1.5 TB with optional storage and I/O expansion blade
Network	2 integrated Gigabit Ethernet controllers
I/O upgrade	1 PCI-X expansion connector and 1 PCI-Express expansion connector
Systems management hardware	Integrated systems management processor
Dimension	30 mm two-socket blade
Max blades per chassis	BladeCenter E 14, BladeCenter H 14, BladeCenter S 6, BladeCenter T 8, BladeCenter HT 12
Operating systems supported	Microsoft Windows, Linux, VMware, and Sun Solaris
I/O ports (max)	8
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [LS22 details on PartnerWorld](#)
- [LS22 details on IBM.com](#)
- [LS22 competitive info on COMP](#)

**Figure L.1.** IBM BladeCenter LS22 at a glance (and links to more detail).

value, the IBM BladeCenter LS42 is the ultimate scalable solution for both two- and four-socket workloads.

Select configurations of the LS22 blade are part of the IBM Express Advantage Portfolio, designed and priced to meet the needs of midsize businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick LS22 facts:

- Run demanding, high performance workloads fast with the latest AMD Opteron six-core processors
- Control power consumption with an energy-efficient blade using high-efficiency processors, low power memory, optional solid-state drives, and IBM Systems Director Active Energy Manager
- Accelerate memory performance with fast 800 MHz options and a standard memory booster.

## LS42

The IBM BladeCenter LS42 blade server ([Figure L.2](#)) is an affordable, scalable two-processor blade server that you can easily upgrade to four processors as your business grows. The LS42 blade server features the latest AMD Opteron processors for industry-leading performance.

Supporting high memory capacity 16 DIMM slots and memory speeds up to 800 MHz, the LS42 can help drive your most demanding memory intensive workloads such as virtualization, databases, and high performance computing (HPC) applications.



**Specifications**

Processor	Latest Six-Core or Quad-core AMD Opteron processor 8000-series, including standard power and high-efficiency models
Number of processors (std/max)	1 or 2/4
Cache (max)	Up to 6 MB shared
Memory (max)	Up to 128 GB DDR II VLP (up to 800 MHz)
Internal storage	Up to 2 SAS or solid-state HDDs installed on each blade (support for up to 3 hot-swap SAS drives with optional storage and I/O expansion blade)
Maximum internal storage	1.5 TB with optional storage and I/O expansion blade
Network interface	2 or 4 integrated Gigabit Ethernet controllers
I/O upgrade	2 PCI-X expansion connectors and 1 PCI-Express expansion connector
Systems management hardware	Integrated systems management processor
Dimension	30 mm two-socket blade or 60 mm four-socket blade
Max blades per chassis	BladeCenter E: 7 or 14, BladeCenter H: 7 or 14, BladeCenter S: 3 or 6, BladeCenter T: 4 or 8, BladeCenter HT: 6 or 12
Operating systems supported	Microsoft Windows, Linux, VMware, and Sun Solaris
I/O ports (max)	8 or 12
Limited warranty	3-year customer replaceable unit and onsite limited warranty

- [LS42 details on PartnerWorld](#)
- [LS42 details on IBM.com](#)
- [LS42 competitive info on COMP](#)

**Figure L.2.** IBM BladeCenter LS42 at a glance (and links to more detail).

The LS42 blade server offers an energy-efficient design along with low-voltage processors, integrated memory controller, and available solid-state drives to help keep power consumption down and reduce cooling demands in your data center.

When workloads demand more performance, this blade server is ready to scale to four processors with the addition of a multi-processor expansion unit (MPE). Simply snap the MPE to the original blade and it becomes a four-processor, 60 mm blade server with the additional performance you need.

Here are some quick LS42 facts:

- Maximize performance and minimize costs; consolidate workloads and virtualization on an energy-efficient platform that supports up to four AMD Opteron six-core processors or quad-core processors.
- Pay as you grow; start with a two-processor blade and upgrade to a four-processor blade when ready without scrapping your initial investment.
- Save time and money; standardize on a single platform for both two- and four-processor server application needs.

## POWER Blades

These blade servers use the IBM POWER processors and are named using a “JS” prefix.

### *JS12 Express*

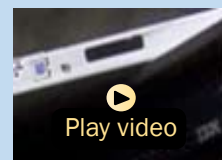
The IBM BladeCenter JS12 Express blade server ([Figure J.1](#)) combined with a BladeCenter S chassis provides exception-



**Specifications**

Form factor	Single-wide blade server for BladeCenter E, BladeCenter S, BladeCenter H, BladeCenter HT, or BladeCenter T chassis
Processor cores	Two 64-bit 3.8 GHz POWER6 with AltiVec SIMD and hardware decimal floating-point acceleration
Level 2 (L2) cache	4 MB per processor core; 4-way set associative
Memory (std/max)	Base/Express offering: 4 GB (2 x 2 GB); Up to 64 GB maximum per blade, eight DIMM slots, ECC Chipkill DDR2 SDRAM running at 667 MHz (2, 4 GB DIMMs) 400 MHz (8 GB DIMMs)
Internal disk storage	Zero to two 73, 146, or 300 GB 2.5" serial attached SCSI (SAS) 10K rpm disk drives Integrated RAID-0 or -1 standard on blade server with support for disk mirroring
Networking	Integrated Virtual Ethernet adapter (IVE) dual gigabit and support for optional dual gigabit Ethernet daughter card
I/O upgrade	Integrated PCI Express connector for high-speed expansion cards, integrated connector for legacy expansion cards
Optional connectivity	1 Gbps Ethernet Expansion Card, 4 Gbps Fibre Channel, 4X InfiniBand, iSCSI Expansion Card, SAS Expansion Card
PowerVM Standard Edition (built-in)	Virtual LAN, POWER Hypervisor, Micro-Partitioning, Virtual I/O Server with Integrated Virtualization Manager, shared dedicated capacity, shared processor pool, PowerVM Lx86
PowerVM Enterprise Edition (optional)	All the features of PowerVM Standard Edition plus Live Partition Mobility and Active Memory Sharing
Operating systems supported	AIX V5.3 or later; IBM i V6.1 or later; SUSE Linux Enterprise Server 10 for POWER (SLES10 SP2) or later; Red Hat Enterprise Linux 4.6 for POWER (RHEL4.6) or later; RHEL5.1 or later
High availability	IBM PowerHA family

- [JS12 Express details on PartnerWorld](#)
- [JS12 Express details on IBM.com](#)
- [JS12 Express competitive info on COMP](#)



**Figure J.1.** IBM BladeCenter JS12 Express at a glance (and links to more detail).

al value and expandability in an attractively packaged and highly efficient design. Specifically designed for an office environment, this combination can reside in your office quietly, securely, and looking like it belongs with an acoustic treatment for quiet operation, a set of security doors to protect vital data and servers, and optional dust filtering to expand IT into virtually any environment. For small database and application serving, the BladeCenter JS12 Express blade server delivers great performance, expandability, and capacity to satisfy the needs of clients looking for an easy-to-use, integrated platform with a high degree of deployment flexibility, scalability, and manageability.

Here are some quick JS12 facts:

- For replacing traditional UNIX, IBM i (formerly known as i5/OS) and Linux servers
- For small database and application serving
- For a complete business system with an integrated database and application server.

### ***JS21 Express***

The IBM BladeCenter JS21 Express blade server ([Figure J.2](#)) is a feature-rich, pre-configured blade designed to meet the stringent requirements of small businesses for advanced technology at a very attractive price. The JS21 Express delivers many leading-edge technologies—support for the IBM AIX 5L and Linux operating systems, IBM Advanced POWER Virtualization (APV) and AltiVec SIMD acceleration functionality—in a single, highly reliable, high-performance, yet cost-efficient



**Specifications**

Form factor	Single-wide blade server for BladeCenter
Processors	64-bit IBM PowerPC 970MP with integrated AltiVec SIMD accelerator
Number of processors	Two-socket single-core (2.7 GHz or 2.6 GHz) or two-socket dual-core (2.5 GHz or 2.3 GHz)
Level 2 (L2) cache	1 MB per core
Memory (std/max)	2 GB (2 x 1 GB in single-core) or 4 GB (2 x 2 GB in dual-core), up to 16 GB maximum per blade, ECC Chipkill DDR2 SDRAM running at 533 MHz, 4 DIMM slots
Internal disk storage	One 73 GB 2.5" Serial Attached SCSI (SAS) 10K rpm hard disk drive standard; up to two 36 GB or 73 GB non-hot-swap hard drives per blade, maximum 146 GB
RAID support	Integrated controller for RAID 0/1 mirroring
Networking	Integrated Broadcom 5780 controller with Dual Gigabit Ethernet, optional dual gigabit Ethernet daughter card
I/O upgrade	Integrated PCI-Express connector for high-speed daughter cards, integrated connector for legacy daughter cards
Optional connectivity	4 Gb Fibre Channel, 1 or 10 Gigabit Ethernet, 1X or 4X InfiniBand
Optional advanced POWER virtualization	Virtual LAN, POWER Hypervisor, Micro-Partitioning, Shared processor pool, Virtual I/O Server with Integrated Virtualization Manager
Systems management	Integrated systems management processor, IBM Director, light path diagnostics, Predictive Failure Analysis, IBM PowerExecutive, cluster systems management, Serial Over LAN, IPMI-compliant
Operating systems supported	AIX 5L V5.2 and V5.3, SUSE Linux Enterprise Server 9 for POWER, Red Hat Enterprise Linux AS 4 for POWER

- [JS21 Express details on PartnerWorld](#)
- [JS21 Express details on IBM.com](#)
- [JS21 Express competitive info on COMP](#)

**Figure J.2.** IBM BladeCenter JS21 Express at a glance (and links to more detail).

blade server. The JS21 Express represents one of the most cost-efficient solutions for UNIX and Linux deployment available on the market.

Here are some quick JS21 Express facts:

- Pre-configured JS21 blade server optimized with fast memory and lots of storage
- Combines the deployment flexibility of IBM BladeCenter with ease of management
- Takes advantage of virtualization technologies to help increase utilization and decrease costs.

### *JS22 Express*

The BladeCenter JS22 Express ([Figure J.3](#)) is a premier SMB (small and medium business) blade for 64-bit applications. It represents one of the most cost-efficient solutions for UNIX, IBM i, and Linux deployments available on the market. Further enhanced by its ability to be installed in the same chassis with other BladeCenter LS, HS, and JS bladeservers, the JS22 Express can deliver the rapid return on investment that small businesses demand.

The JS22 Express blade has been pre-configured and tested by IBM and is based on proven technology. Utilizing a 4.0 GHz 64-bit POWER6 processor core and available in a four-core configuration, it is designed to deliver outstanding performance at compelling prices.

Here are some quick JS22 facts:

- For consolidating UNIX, IBM i, or Linux servers into a centralized BladeCenter infrastructure





**Specifications**

Form factor	Single-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Four 64-bit 4.0 GHz POWER6 with Altivec SIMD and hardware decimal floating-point acceleration
Level 2 (L2) cache	4 MB per processor core; 4-way set associative
Memory (std/max)	Base offering: 2 GB (2 x 1 GB); Express offering: 4 GB (2 x 2 GB), up to 32 GB maximum per blade, 4 DIMM slots, ECC Chipkill DDR2 SDRAM running at 667 MHz (1, 2, 4 GB DIMMs) 533 MHz (8 GB DIMMs)
Internal disk storage	One 73 or 146 GB 2.5" serial attached SCSI (SAS) 10K rpm non-hot-swappable disk drive standard on Express offering; No disk drive required on base offering
Network Interface	Integrated Virtual Ethernet adapter (IVE) Dual Gigabit and support for optional dual gigabit Ethernet daughter card
I/O upgrade	Integrated PCI Express connector for high-speed daughter cards, integrated connector for legacy daughter cards
Optional connectivity	1 Gbps Ethernet Expansion Card, 4 Gbps Fibre Channel, 4X Infini-Band, SAS Expansion Card
PowerVM Standard Edition (built-in)	Virtual LAN, POWER Hypervisor, Micro-Partitioning, Virtual I/O Server with Integrated Virtualization Manager, Shared Dedicated Capacity, PowerVM Lx86 (formerly known as System p Application Virtual Environment)
PowerVM Enterprise Edition (optional)	All the features of PowerVM Standard Edition plus Live Partition Mobility
Systems management	Integrated systems management processor, IBM Systems Director Active Energy Manager, light path diagnostics, Predictive Failure Analysis, cluster systems management (CSM), Serial Over LAN, IPMI-compliant

- [JS22 Express details on PartnerWorld](#)
- [JS22 Express details on IBM.com](#)
- [JS22 Express competitive info on COMP](#)

**Figure J.3.** IBM BladeCenter JS22 Express at a glance (and links to more detail).

- For business performance applications like smaller database, OLTP, and business intelligence
- For HPC workloads such as weather forecasting, seismic processing, molecular dynamics, and computational fluid dynamics.

### *JS23 and JS43*

Built on the promise of the IBM BladeCenter family of products—easy-to-use, integrated platforms with a high degree of deployment flexibility, energy efficiency, scalability, and manageability—the BladeCenter JS23 and JS43 Express are the premier blades for 64-bit applications ([Figure J.4 and J.5](#)). They represent one of the most flexible and cost-efficient solutions for UNIX, IBM i and Linux deployments available in the market. Further enhanced by its ability to be installed in the same chassis with other IBM BladeCenter blade servers, the JS23 and JS43 can deliver the rapid return on investment that clients and businesses demand. Delivering on the promise of a truly dynamic infrastructure, the BladeCenter JS23 and JS43 help in delivering superior business and IT services with agility and speed—all in a simple to manage highly efficient way.

Here are some quick JS23 and JS43 facts:

- Ideal for infrastructure consolidation, virtualization, and demanding applications that require scalable performance and high memory capacity
- IBM POWER6 processor technology and the ability to run AIX, IBM i, and Linux operating systems simultaneously



**Specifications**

Form factor	Single-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Four 64-bit 4.2 GHz POWER6 with Altivec SIMD and Hardware Decimal Floating-Point acceleration
Level 2 (L2) cache	4 MB per processor core; 4-way set associative
Level 3 (L3) cache	32 MB per processor socket
Memory (std/max)	Base offering: 4 GB (2 x 2 GB); Express offering: 4 GB (2 x 2 GB), up to 64 GB maximum per blade, 8 DIMM slots, ECC IBM Chipkill DDR2 SDRAM running at 667 MHz (2 and 4 GB DIMMs) 400 MHz (8 GB DIMMs)
Internal disk storage	One 73, 146, or 300 GB 2.5" Serial Attached SCSI (SAS) 10K rpm non-hot-swappable disk drive or 69 GB solid state disk; No disk drive required on base offering
Networking	Integrated Virtual Ethernet adapter (IVE) Dual Gigabit and support for optional dual gigabit Ethernet daughter card
I/O upgrade	One PCI-E CIOv Expansion Card and one PCI-E CFFh High Speed Expansion Card
Optional connectivity	1 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion
PowerVM Standard Edition (built-in)	Virtual LAN, POWER Hypervisor, Micro-Partitioning, Virtual I/O Server with Integrated Virtualization Manager, Shared Dedicated Capacity, PowerVM Lx86
PowerVM Enterprise Edition (optional)	All the features of PowerVM Standard Edition plus Live Partition Mobility and Active Memory Sharing
Operating systems supported	AIX V5.3 or later, AIX V6.1 or later; IBM i 6.1 or later SUSE Linux Enterprise Server 10 for POWER (SLES10 SP2) or later; Red Hat Enterprise Linux 4.6 for POWER (RHEL4.6) or later; RHEL5.1 or later
High availability	IBM PowerHA family

- [JS23 info on PartnerWorld](#)
- [JS23/JS43 info on IBM.com](#)
- [JS23 competitive info on COMP](#)

**Figure J.4.** IBM System JS23 at a glance (and links to more detail).



## Specifications

Form factor	Double-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Eight 64-bit 4.2 GHz POWER6 with AltiVec SIMD and Hardware Decimal Floating-Point acceleration
Level 2 (L2) cache	4 MB per processor core; 4-way set associative
Level 3 (L3) cache	32 MB per processor socket
Memory (std/max)	Base offering: 8 GB (2 x 4 GB); Express offering: 8 GB (2 x 4 GB), up to 128 GB maximum per blade, 16 DIMM slots, ECC Chipkill DDR2 SDRAM running at 667 MHz (2 and 4 GB DIMMs) 400 MHz (8 GB DIMMs)
Internal disk storage	One or two 73, 146, or 300 GB 2.5" Serial Attached SCSI (SAS) 10K rpm non-hot-swappable disk drive or 69 GB solid state disk; No disk drive required on base offering.
Networking	Integrated Virtual Ethernet adapter (IVE) Dual Gigabit and support for optional dual gigabit Ethernet daughter card
I/O upgrade	Two PCI-E CIOv Expansion Cards and two PCI-E CFFh High Speed Expansion Cards
Optional connectivity	1 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion
PowerVM Standard Edition (built-in)	Virtual LAN, POWER Hypervisor, Micro-Partitioning, Virtual I/O Server with Integrated Virtualization Manager, Shared Dedicated Capacity, PowerVM Lx86
PowerVM Enterprise Edition (optional)	All the features of PowerVM Standard Edition plus Live Partition Mobility and Active Memory Sharing
Operating systems supported	AIX V5.3 or later, AIX V6.1 or later; IBM i 6.1 or later SUSE Linux Enterprise Server 10 for POWER (SLES10 SP2) or later; Red Hat Enterprise Linux 4.6 for POWER (RHEL4.6) or later; RHEL5.1 or later
High availability	IBM PowerHA family

- [JS43 info on PartnerWorld](#)
- [JS23/JS43 info on IBM.com](#)
- [JS43 competitive info on COMP](#)

**Figure J.5.** IBM System JS43 at a glance (and links to more detail).

- Elegantly simple scalability, allowing easy expansion and pay-as-you-grow flexibility for the utmost in investment protection and performance growth
- A secure, resilient, and dynamic infrastructure solution that helps drive down costs, reduce risk, improve energy efficiency, and enhance flexibility.

## Cell/B.E. Blades

For many years, organizations have relied on performance gains from increasing clock speeds of “traditional” microprocessor architectures. However, in recent years this approach has been challenged by the physical limitations of semiconductors and by traditional processor architecture implementations. Issues with power consumption, heat dissipation, and memory latencies have led to diminishing returns on performance. High performance computing (HPC) cluster applications such as digital content creation, digital video surveillance, electronic design automation, image and signal processing, financial algorithms, scientific research, and seismic processing, may need a fundamentally new technology and approach to the system-level architecture to achieve the desired level of performance.

In this section we examine blade servers based on the Cell/B.E. processor designed to meet these needs by complementing systems based on traditional processors to accelerate parallel processing and streaming applications.

## QS22

The IBM BladeCenter QS22 ([Figure Q.1](#)) is based on the innovative multi-core IBM PowerXCell 8i processor, a new generation processor based on the Cell Broadband Engine (Cell/B.E.) Architecture. Offering extraordinary double precision floating point processing power, the QS22 can yield application results faster and with more fidelity. This can enable organizations to get information faster to facilitate important business decisions.

Part of the BladeCenter family of products, the QS22 is a high-performance blade that extends and deepens the IBM HPC solution portfolio by providing a new level of parallelism and performance to targeted workloads. The PowerXCell 8i multi-core processor architecture helps the QS22 accelerate key algorithms such as 3D rendering, compression, and encryption and enables companies to create and run highly visual, immersive, real-time applications. This performance offers significant potential benefit for even the most demanding applications used in aerospace and defense, health care, life sciences, petroleum exploration, financial markets, digital media, electronics, government, education, and other industries.

Here are some quick QS22 facts:

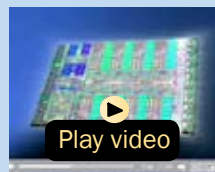
- Third generation blade system based on an enhanced version of the Cell Broadband Engine Architecture
- IBM PowerXCell 8i processor, offering five times the double precision performance of the previous Cell/B.E. processor
- High-performance blade solution for selected workloads



### Specifications

Form factor	Single-wide blade server for BladeCenter
BladeCenter compatibility	BladeCenter H, HT, and S
Processors	3.2 GHz IBM PowerXCell 8i Processors
Number of processors	2 standard, each with 1 PPE core and 8 enhanced double precision (eDP) SPE cores
L2 cache	512 KB per IBM PowerXCell 8i Processor, plus 256 KB of local store memory for each eDP SPE
Memory	Up to 32 GB (16 GB per processor)
Internal disk storage	Optional 8 GB flash drive
Optional external storage	BladeCenter boot disk system (1726-22B)
Networking	Dual Gigabit Ethernet
I/O upgrade	Serial attached SCSI (SAS) daughter card connected via PCI-X (CFFv) BladeCenter PCIe expansion unit (43W4391)
Optional connectivity	Dual-port DDR InfiniBand 4x HCA connected via PCI-Express (43W4423)
Operating systems supported	Red Hat Enterprise Linux
Warranty	3-year

- [QS22 details on PartnerWorld](#)
- [QS22 details on IBM.com](#)
- [QS22 competitive info on COMP](#)



**Figure Q.1.** IBM BladeCenter QS22 at a glance (and links to more detail).

- Significant performance acceleration of target workloads such as rendering and medical imaging
- Up to 32 GB of processor memory.

## BladeCenter Open Fabric (I/O)

In this section, we examine some options collectively called the BladeCenter Open Fabric. This is a portfolio of integrated server I/O that offers an open, high performance, and comprehensive set of interconnects and smart management tools to help run your business. Integrated across all blades, switches, and chassis, BladeCenter Open Fabric supports

### MORE ON THE WEB

- [BladeCenter Open Fabric info on IBM.com](#)

open standards and industry interoperability across five I/O fabrics, including Fibre Channel, InfiniBand,

Ethernet, iSCSI, and serial attached SCSI (SAS), helping to simplify blade I/O management and deployment so you can concentrate on realizing innovation in your business.

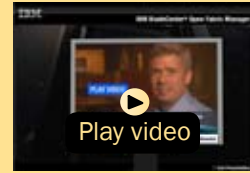
## BladeCenter Open Fabric Manager

IBM BladeCenter Open Fabric Manager is designed to help you manage growth and complexity by making it easy to manage I/O and network interconnects for up to 100 BladeCenter chassis—up to 1400 blade servers. BladeCenter Open Fabric Manager helps make blade deployment EASY: Once installed, the utility is resident in the Advanced Management Module (AMM) so you can pre-configure LAN and SAN connections.



## MORE ON THE WEB

- [BladeCenter Open Fabric Manager info on IBM](#)
- [BladeCenter Open Fabric Manager competitive info on COMP](#)



*IBM BladeCenter  
Open Fabric Manager  
(Alex Yost) (4:50)*

Thus, I/O connections are made automatically when you plug in a blade. And no special tools or training are required; just manage with the easy-to-use GUI.

In contrast to typical competitive tools that only support a small number of proprietary blades and switches, BladeCenter Open Fabric Manager is OPEN and allows you to manage a wide range of industry Ethernet and Fibre Channel switches—Cisco, Nortel, Brocade, QLogic.

BladeCenter Open Fabric Manager is the RIGHT CHOICE now and into the future. The software can even be deployed on existing hardware through a firmware upgrade, helping you protect your current BladeCenter investments and giving you the flexibility to deploy precisely the solution you need to help your business realize innovation.

## Ethernet Switch Modules

Here we will look at the switch modules that allow BladeCenter to participate in an Ethernet network.

## 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 non-blocking 10

### MORE ON THE WEB

- [10 Gb Ethernet Pass-Thru Module Redbook info](#)
- [10 Gb Ethernet Pass-Thru Module info on PartnerWorld](#)

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 14 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.

Here are some quick 10 Gb Ethernet Pass-Thru Module facts:

- Single-wide high-speed switch module
- 14 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).

## BNT 10-Port 10 Gb Ethernet Switch Module

The BNT 10-port 10 Gb Ethernet Switch Module for IBM BladeCenter offers the most bandwidth of any blade switch and represents the perfect migration platform for clients who are still at 1 Gb outside the chassis by seamlessly integrat-

### MORE ON THE WEB

- [BNT 10-Port 10 Gb Ethernet Switch Module Redbook info](#)
- [BNT 10-Port 10 Gb Ethernet Switch Module info on PartnerWorld](#)

ing in the existing 1 Gb infrastructure. This is the first 10 Gb switch for IBM BladeCenter which is convergence ready—able to transmit Converged Enhanced Ethernet (CEE) to a Fibre Channel over Ethernet (FCoE) capable top-of-rack switch. This feature will be available through a future firmware upgrade at no additional cost.

This offering will also work with BladeCenter Open Fabric Manager, providing all the benefits of I/O Virtualization at 10 Gb speeds.

Here are some quick BNT 10-Port 10 Gb Ethernet Switch Module facts:

- Single-wide high-speed switch module
- 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

- 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.

### ***BNT Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Module***

The BNT 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.

Here are some quick BNT Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Module facts:

- 14 internal full-duplex Gigabit ports
- Two internal full-duplex 10/100 Mbps ports
- Copper switch: Six 1000BASE-T copper RJ-45 connections
- Fiber switch: Six 1000BASE-SX SFP transceiver-based LC fiber connections
- Autosensing 10/1000/1000 Mbps external Ethernet ports for bandwidth optimization

#### **MORE ON THE WEB**

- [BNT Layer 2/3 Copper/Fiber Gigabit Ethernet Switch Module Redbook info](#)
- [BNT Layer 2/3 Copper/Fiber Gigabit Ethernet Switch Module info on PartnerWorld](#)

- Non-blocking architecture with wire-speed forwarding of traffic.

### ***BNT Layer 2-7 Gigabit Ethernet Switch Module***

BLADE Network Technologies (BNT) offers a Layer 2-7 Gigabit Ethernet Switch Module which enables you to consolidate full Layer 2-7 LAN switching capabilities into IBM BladeCenter. Consolidation flattens the topology of the data center infrastructure and reduces the number of discrete devices, management consoles, and manufacturers that you have to deal with. And the L2-7 Switch Module includes advanced security, high availability, and performance features, further reducing the need for discrete function-specific appliances. The result is dramatic simplification of the data center infrastructure and this translates into faster performance, higher availability, greater scalability, stronger security, simplified management, and lower TCO.

Here are some quick BNT Layer 2-7 facts:

- Improve application availability and boost application performance
- Increase application and server scalability
- Enhance application and server security
- Simplify server deployment and management

#### **MORE ON THE WEB**

- [BNT Layer 2-7 Gigabit Ethernet Switch vModule info on PartnerWorld](#)

- Reduce data center total cost of ownership (TCO).

## *Cisco Catalyst Switch Module 3012*

The Cisco Catalyst Switch Module 3012 for IBM BladeCenter represents the next-generation networking solution for blade server environments. Built on the market-leading Cisco hardware and Cisco IOS Software, the Cisco Catalyst Switch

### **MORE ON THE WEB**

- [Cisco Catalyst Switch Module 3012 info on PartnerWorld](#)
- [Cisco Catalyst Switch Module 3012 info on IBM.com](#)

Module 3012 is engineered with unique technologies specifically designed to meet

the rigors of blade server-based application infrastructure for the small and medium enterprise.

Here are some quick 3012 facts:

- Cisco Catalyst Switch Module 3012 provides four external 1 Gb ports and 14 internal 1 Gb ports
- Operates in a standard I/O module bay across all chassis types
- Fully compatible with Open Fabric Manager—enabled for I/O virtualization with no changes required in switch module during installation or after blade replacement or failover
- Supports Layer 2 and basic Layer 3 switching (static routing and RIP)
- Common management with external Cisco switches via IOS Command Line Interface and CiscoWorks LAN Management Solution.

## Cisco Catalyst Switch Modules 3110G and 3110X

The Cisco Catalyst Switch Modules 3110G and 3110X represent the next-generation networking solution for blade server environments. Built on the market-leading Cisco hardware and Cisco IOS Software, the Cisco Catalyst Switch Module 3110 is engineered with unique technologies specifically designed to meet the rigors of blade server-based application infrastructure. Specifically, the switch is designed to deliver scaleable, high-performance, highly resilient connectivity while supporting ongoing IT initiatives to reduce server infrastructure complexity and total cost of ownership (TCO).

Here are some quick 3110G and 3110X facts:

- Cisco Catalyst Switch Module 3110G provides four external 1 Gb ports and 14 internal 1 Gb ports
- Cisco Catalyst Switch Module 3110X provides one external 10 Gb uplink port and 14 internal 1 Gb ports
- Perfect for large enterprises where Cisco's VBS technology enables rack-level link consolidation and switch management
- Fully compatible with Open Fabric Manager—enabled for I/O virtualization with no changes required in switch module during installation or after server blade replacement or failover

### MORE ON THE WEB

- [Cisco Catalyst Switch Modules 3110G/3110X info on PartnerWorld](#)
- [Cisco Catalyst Switch Module 3110G info on IBM.com](#)
- [Cisco Catalyst Switch Module 3110X info on IBM.com](#)

- Base switch supports Layer 2 and basic Layer 3 switching; IP Services S/W upgrade enables OSPF and BGP routing; Advanced I/P Services S/W upgrade enables IPv6n
- Operates in standard I/O module bay across BladeCenter E, H, T, and HT chassis types
- Separately available are two optional S/W keys for the Cisco Catalyst 3110 switch modules.

### *Intelligent Copper Pass-Thru Module*

The Intelligent Copper Pass-Thru Module (ICPM) is designed for those IT organizations that wish to deploy their IBM BladeCenter servers directly into their existing networking infrastructure, and require line rate performance. The ICPM provides many additional functions not available on the older IBM Copper Pass-Thru Module (CPM), and is supported in all BladeCenter chassis and the Multi-Switch Interconnect Module (MSIM). The ICPM is designed to exploit management capabilities of the management modules or advanced management modules (MM/AMM).

The moment a cable is plugged into the uplink ports of the ICPM and the upstream switch, the ICPM automatically negotiates the best connection to the upstream switch with no further action required. Unlike the older IBM CPM, which used fan-out cables that were limited 3 meter lengths, the ICPM is designed to use standard Ethernet cables with lengths up to 100

#### **MORE ON THE WEB**

- [Copper Pass-Thru info on PartnerWorld](#)
- [Copper Pass-Thru info on IBM.com](#)



meters to connect to upstream networking equipment. And instead of using three fan-out cables, the ICPM's uplink ports use 14 separate Ethernet cables, which reduces the impact of any single cable failure.

Here are some quick Copper Pass-Thru Module facts:

- Ideal for clients whose applications require 100 percent line rate performance
- Easy to install and does not require any networking knowledge
- Compatible with Serial Over LAN (SoL) and secure Concurrent KVM
- Fully compatible with BladeCenter Open Fabric Manager.

### ***BNT 1/10 Gb Uplink Ethernet Switch Module***

The BladeCenter Network Technology (BNT) 1/10 Gb Uplink Ethernet Switch Module for IBM BladeCenter is an innovative switch designed to meet the growing bandwidth needs of our clients. Today while our clients look to implement solutions to meet their current 1 Gb requirements, they also need a way to migrate easily to 10 Gb. This switch provides investment protection and future proofing since it supports both 1 Gb and 10 Gb ports concurrently.

#### **MORE ON THE WEB**

- [Nortel BNT 1/10 Gb Ethernet Switch info on PartnerWorld](#)
- [Ethernet I/O info on IBM.com](#)

Here are some quick BNT 1/10 Gb Uplink Ethernet Switch Module facts:

- Includes six 1 Gb and three 10 Gb Ethernet Uplinks for unmatched upstream bandwidth
- Supported in all five IBM BladeCenter chassis in addition to Multi-Switch Interconnect Module (MSIM) for IBM BladeCenter and IBM BladeCenter HT
- Designed for extreme lower power consumption
- Full Ethernet Layer 2/3 functionality comes standard.

### ***BNT 6-port 10 Gb Ethernet Switch Module***

The BNT 6-port 10 Gb Ethernet Switch Module for IBM BladeCenter is ideal for VoIP and IPTV applications requiring high-bandwidth and time-sensitive switching support. It is

#### **MORE ON THE WEB**

- [6-port 10 Gb Ethernet Switch Module info on PartnerWorld](#)
- [Ethernet I/O info on IBM.com](#)

supported on BladeCenter H and HT chassis, multi-switch interconnect

modules, and is compatible with BladeCenter Open Fabric Manager.

### ***Server Connectivity Module for IBM BladeCenter***

As small and midsize businesses try to squeeze more value from their IT systems and onsite networking skills, the Server Connectivity Module for IBM BladeCenter delivers a range of capabilities in scalable, flexible configurations. An intuiti-

## MORE ON THE WEB

- [Server Connectivity Module for IBM BladeCenter info on PartnerWorld](#)
- [Server Connectivity Module for IBM BladeCenter info on IBM.com](#)

tive graphical user interface (GUI) and integrated management software make this module affordable and simple for IT administrators to deploy, manage, and maintain—delivering more value with fewer resources. And the networking features of the Server Connectivity Module have been designed to prevent an improperly configured device from disrupting the network infrastructure, helping enable critical system uptime and uninterrupted operation.

Here are some quick facts about this module:

- Serves the needs of small and midsize business customers
- Easy to install, configure, and manage through an easy-to-use browser-based interface
- Ideal for environments where a separation between the server and networking domains is preferred.

## Fibre Channel Switch Modules

This section covers switch modules that allow for the attachment of BladeCenter to fibre storage area networks.

### *Cisco 4 Gb 10 and 20-port Fibre Channel*

These latest Fibre Channel switching options integrate an enterprise fabric into the BladeCenter architecture, providing

## MORE ON THE WEB

- [Cisco 4 Gb 10 and 20-port Fibre Channel Switch info on PartnerWorld](#)
- [Cisco 4 Gb 10 and 20-port Fibre Channel Switch info on IBM.com](#)

high-bandwidth connectivity. They offer high-performance, highly available storage area networks (SANs) at a competitive price, and are easy to set up and integrate into core or edge SAN configurations.

Here are some quick Cisco 4 Gb 10 and 20-port Fibre Channel Switch facts:

- Enables high-performance end-to-end 1, 2, and 4 Gigbits per second SAN solutions for the data center
- Affordable 10 port and 20-port offerings available for small, medium, and large enterprise business needs
- Exciting addition to the Cisco Ethernet and MDS family of products
- Includes Tivoli SAN manager enhancements to better manage MDS9000 with integrated IBM SAN Volume Controller
- 10-port upgrade available for on demand scaling to a 20-port switch
- Cisco SFPs are required
  - Long-wave 41Y8600
  - Short-wave 41Y8598
  - Short-wave 4-pack 41Y8596.

## Brocade 10 and 20-port SAN

IBM adds more value to BladeCenter with integrated Brocade storage area network (SAN) switch modules with 4 Gbps performance. Compatibility and full interoperability with existing Brocade fabrics and IBM System Storage SAN switches enhance scalability. Additional features help improve system SAN security and performance. And by providing full integration of Brocade enterprise fabric into the BladeCenter architecture, the Brocade SAN switch helps improve system manageability and simplifies the infrastructure.

Here are some quick Brocade SAN Switch facts:

- Enables high-performance end-to-end 1, 2, and 4 Gigbits per second SAN solutions for the data center
- Affordable 10-port and 20-port offerings available for small, medium, and large enterprise business needs
- Easy-to-use non-disruptive upgrade doubles the 10-port switch connectivity to 20 ports when your business needs change
- Integrates the Brocade SAN fabric to simplify deployment/management and reduce infrastructure complexity and total cost of ownership
- Utilizes Brocade's proven Silkworm technology and is fully backward compatible and interoperable with Silkworm and IBM TotalStorage b-type SAN switches.

### MORE ON THE WEB

- [Brocade SAN Switch info on PartnerWorld](#)
- [Brocade SAN Switch info on IBM.com](#)

## *QLogic 4 Gb Pass-Thru Fibre Channel*

The QLogic Intelligent 4 Gb Pass-Thru Fibre Channel Module provides seamless interoperability to an external SAN fabric, primarily those utilizing the extended features from their SAN infrastructure provider. This product is ideal for those

### **MORE ON THE WEB**

- [QLogic 4 Gb Pass-Thru Fibre Channel info on PartnerWorld](#)
- [QLogic 4 Gb Pass-Thru Fibre Channel info on IBM.com](#)

clients with existing SANs that want to integrate BladeCenter cost effectively, and

without disruption to their existing SAN. This product provides additional functionality via a software upgrade option to open-standard full-fabric functionality utilizing the full-fabric mode.

Here are some quick QLogic 4 Gb Pass-Thru Module facts:

- Affordable 4 Gb solution delivers an alternative to traditional optical pass-thru module
- Six external 4 Gb ports
- Supported across all BladeCenter chassis and multi-switch interconnect modules
- Provides open, standards-based NPIV interface simplifying SAN interoperability and scalability.

## *QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module*

The QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module for IBM BladeCenter provides double the throughput of the 4 Gb module described above. It provides an alternative to the traditional optical pass-thru module with six external

## MORE ON THE WEB

- [QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module info on PartnerWorld](#)
- [Fibre Channel Switch info on IBM.com](#)

8 Gb ports. It is supported across all BladeCenter chassis and multi-switch interconnect modules.

### *QLogic 10 and 20-port 4 Gb Fibre Channel*

The QLogic 10 and 20-port 4 Gb Fibre Channel Switch Modules and 4 Gb expansion card for IBM BladeCenter enable an end-to-end 4 Gb SAN solution for blade servers. Both 10 and 20-port modules offer easy-to-use wizards, storage area network (SAN) management flexibility, and interoperability with other major manufacturers' FCSW2- and FCSW3-compliant storage networking products.

#### MORE ON THE WEB

- [QLogic Fibre Channel Switch info on PartnerWorld](#)
- [Fibre Channel Switch info on IBM.com](#)

Here are some quick QLogic Fibre Channel Switch facts:

- Enables high-performance end-to-end 1, 2, and 4 gigabits per second SAN solutions
- Provides interoperability in open mode leveraging standards-compliant (FCSW2 & FCSW3) SANs
- Affordable 10-port and 20-port offerings available—ideal for small, medium, and large enterprise business needs

- Easy-to-use software upgrade doubles your 10-port switch connectivity to 20 ports for on demand scalability
- Included with every switch, QLogic's SANsurfer Management Suite eases installation, configuration, and management of your SAN infrastructure—all from one GUI.

### **QLogic 20-port 8 Gb SAN Switch Module**

The QLogic 20-port 8 Gb SAN Switch Module for IBM BladeCenter offers double the throughput of the 4 Gb version described above. It enables high-performance 2, 4, and 8

#### **MORE ON THE WEB**

- [QLogic 20-port 8 Gb SAN Switch Module info on PartnerWorld](#)
- [Fibre Channel Switch info on IBM.com](#)

gigabits per second SAN solutions and provides interoperability

in open mode leveraging standards-compliant (FC-SW2 & FC-SW3) SANs. This 20-port switch module is supported on BladeCenter E, H, T, and HT chassis and multi-switch interconnect modules.

### **InfiniBand Switch Modules**

InfiniBand is recognized as an industry-standard fabric for creating clusters that address high performance computing (HPC) requirements such as those found in scientific, technical, and financial applications. The InfiniBand high-bandwidth fabric permits high-speed interconnection between cluster servers to enable fast performance. In this section, we will cover a module that allows BladeCenter to participate with Infiniband.



## 4x InfiniBand Pass-Thru

The 4x InfiniBand Pass-Thru Module delivers the highest chassis throughput and performance in the industry. Especially important in high performance computing environments, this module enables BladeCenter server systems to form high-performance clusters and grids that deliver the performance required to realize the full potential of next-generation applications and systems.

### MORE ON THE WEB

- [4x InfiniBand Pass-Thru info on PartnerWorld](#)
- [4x InfiniBand Pass-Thru info on IBM.com](#)

Here are some quick facts about this module:

- Delivers the highest chassis throughput and performance in the industry
- Combined with DDR HCAs, this module provides 14 4x DDR ports of connectivity to blades and 14 4x DDR external ports from the BladeCenter H chassis
- Supports Message Passing Interface (MPI), IP over InfiniBand (IPoIB), and Sockets Direct Protocol (SDP), which use InfiniBand Remote Direct Memory Access (RDMA) to support the most demanding high-performance computing applications and high-performance database clusters.

## Voltaire 40 Gb InfiniBand Switch Module

The Voltaire 40 Gb InfiniBand Switch Module for BladeCenter provides InfiniBand QDR connectivity between the server platform's high performance blade servers and external InfiniBand fabrics in non-blocking designs, all on a single device.

## MORE ON THE WEB

- [Voltaire 40 Gb InfiniBand Switch Redbook Technote](#)
- [Voltaire 40 Gb InfiniBand Switch info on PartnerWorld](#)

Voltaire's high speed module also accommodates performance-optimized fabric

designs utilizing a single BladeCenter chassis or stacking multiple BladeCenter chassis without requiring an external InfiniBand switch.

The InfiniBand Switch Module offers 14 Gb ports, one to each server, and 16 ports out of the chassis per switch. This solution offers a no compromise, congestion free solution to meet even the most performance hungry applications.

Here are some quick Voltaire 40 Gb InfiniBand Switch facts:

- Full QDR rate InfiniBand switching
- Based on the Infiniscale-IV device
- Up to 40 Gbps performance for clusters and grids (bidirectional)
- Hot-swap support, with soft start and current limiting
- Bay address and presence support.

## SAS I/O

In this section, we will look at the SAS (serial attached SCSI) I/O family of switches that enable BladeCenter to leverage storage that provides unprecedented performance and ease of use.

## BladeCenter S SAS RAID Controller Module

IBM BladeCenter is the industry's premier server portfolio, and has been helping clients simplify IT, making it easier to deploy, own, and manage servers, storage, and IO. IBM is extending that promise by making available the IBM BladeCenter S SAS RAID Controller Module. Quite simply, the SAS RAID Controller Module can enable the benefits of a SAN right inside the BladeCenter S chassis.

The IBM BladeCenter S SAS RAID Controller Module is an innovative approach to efficient IT. Rather than manage RAID at several adapters, the SAS RAID Controller consolidates this function at the switch level, simplifying management and minimizing costs. Combine this with the ability to deliver RAID 0, 1, 0+1, and 5 while also allowing shared storage for up to six blade servers, the SAS RAID Controller Module is the only slide-in way to get your SAN up and running in no time.

Here are some quick SAS RAID Controller Module facts:

- Enhanced domain knowledge and function in Microsoft application monitors
- Improved problem determination by combining data from multiple Microsoft application monitors
- Automated Microsoft business practices

### MORE ON THE WEB

- [BladeCenter S SAS RAID Controller Module info on PartnerWorld](#)
- [BladeCenter S SAS RAID Controller Module info on IBM.com](#)

- Integration of data and events with other Tivoli Enterprise Portal (TEP)-based solutions from IBM Tivoli Composite Application Manager (ITCAM), ITM, and OMEGAMON allows comprehensive management of your business applications.

## SAS Connectivity Module

The IBM BladeCenter SAS Connectivity Module is a high-

### MORE ON THE WEB

- [SAS Connectivity Module info on PartnerWorld](#)
- [SAS Connectivity Module info on IBM.com](#)

performance 3 Gbps SAS based pass-thru module that enables broad storage functionality for all BladeCenter chassis.

Here are some quick SAS Connectivity Module facts:

- Enables up to 12 3.5-inch SAS or SATA disks in BladeCenter S using the Disk Storage Module (DSM)
- Enables use of entry storage products such as IBM System Storage DS3200 with BladeCenter chassis
- Two switches enable fully redundant capability in BladeCenter chassis
- High-performance, fully duplex, 3 Gbps speeds.

## About the Editor

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Jim Hoskins is the founder of Maximum Press, a premier publisher of books, ebooks, and rich media that help businesses apply technology profitably. Jim has been involved with computer technology design, implementation, and education for over 25 years. He is the author of many articles and books covering a wide range of technology and Internet business topics. Jim spent a decade with IBM designing computer systems and directly helping businesses of all sizes design and implement real-world solutions. He is the author/editor of the popular *Exploring IBM* series which has sold over 350,000 copies in 12 languages. Jim has a degree in electrical engineering from the University of Florida and resides in Gulf Breeze, Florida, with his wife and five children. You can reach Jim via email at [jimh@maxpress.com](mailto:jimh@maxpress.com).

