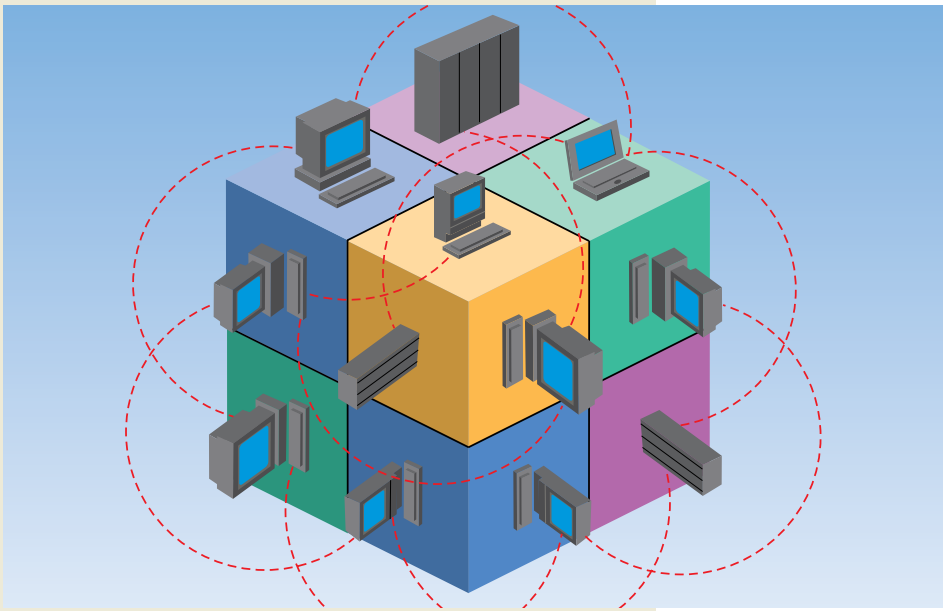
IBM System x and BladeCenter Business Partner Guidebook

Your Roadmap to Success with IBM System x and BladeCenter

Max Facts™ eBook



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Edited by Jim Hoskins

IBM System x and BladeCenter Business Partner Guidebook

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IBM System x and BladeCenter Business Partner Guidebook

Tenth Edition

Your Roadmap to Success with IBM System x and BladeCenter

Edited by Jim Hoskins

(version 10.1e)

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Table of Contents

What's New in This Edition?

This edition of the ebook has been updated to include IBM System x and BladeCenter products announced through May 2008.

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

- x3455
- x3655
- x3755
- BladeCenter E chassis
- HS12
- HS21 XM
- QS22

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 ebook 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 ebook 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 ebook

2. Apply for Your IBM PartnerWorld Membership

The IBM PartnerWorld Web site 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

More On The Web

- Explore PartnerWorld
- PartnerWorld contact phone numbers by country
- Get your PartnerWorld user ID

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

More On The Web

- Get plugged in to IBM product and program communications

4. Review the System x Express Portfolio

The IBM Express 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, some BladeCenter, and all IntelliStation products are now offered as Express models, which offer more aggressive pricing, faster availability, and ease of installation. Become familiar with IBM Express and you will have solutions for your customers that you can deploy quickly and grow as needed.

More on the Web

- IBM Express portfolio

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 medium 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 road maps 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

About This eBook

This MaxFacts™ interactive ebook 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.

As we are always working to better help you succeed, please forward any comments or suggested improvements to this ebook to info@maxpress.com.

Products May Vary from Country to Country

Keep in mind that the specific products and services offered by IBM sometimes vary from country to country. As such, you will need to get into the details of your country's offerings by following the "More on the Web" links provided throughout this ebook with your country selected in the upper area of the screen.

How To Use This MaxFacts™ Interactive eBook

This ebook has been specially designed to be read on your computer screen using the free Adobe Acrobat Reader software or a supporting Web browser. Alternately, you can print this ebook on most any printer and read the material anywhere.

Reading on a computer screen at your desk isn't as cozy as reading a printed page while lying on a towel at the beach. If you give it a fair chance, however, you will find that navigating the bookmarks along the left side of the screen provides an effective way to get to the information you need—quickly. Further, the instant access to expanded information provided by the many embedded Web links along with the "search" function also makes using this ebook "on screen" worthwhile. We recommend that you copy this PDF file to your desktop so it will always be only "one click away." If you still want a hard copy, you can print it out on almost any printer.

Links provided throughout this ebook (anywhere you see a "More on the Web" box or embedded within some figures) will lead you to additional information related to the topic at hand resident on the Web. In this way, this ebook is a "three-dimensional guide" providing you with information about the topics at the level of detail you choose. To follow a link, simply click on it and a Web browser window will appear on your screen with the requested information. If the link brings you to a password-protected area (e.g., on the IBM PartnerWorld or COMP Web sites), you will be prompted to enter your IBM-issued user ID and password before you are presented with information.

When you are done exploring, just close or minimize the Web browser window and you will arrive back at the ebook. You are encouraged to explore all links that interest you to get the most out of this ebook. You must have an active connection to the Internet to use the embedded links.

To navigate around within this ebook, you can:

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- Click on the "bookmark" links shown on the left side of your screen to go directly to that part of the ebook
- Click on the "Table of Contents" links to go directly to that part of the ebook
- Search for keywords in the document using the Acrobat Reader "Find" function (the binoculars icon on the toolbar).

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More on the Web

- Maximum Press Web site

1

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 it wants to go.

It is this dedication to the success of our channel partners that helped IBM win the Computer Reseller News Channel Champs award for midrange servers (more than $25K in price), which included System x servers.

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 has 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 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.

More on the Web

- About IBM's patent portfolio

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. Choose right. Choose IBM.

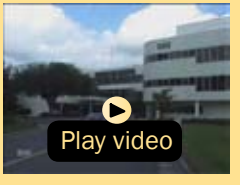
IBM System x Enterprise Servers

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 X3 and 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

More on the Web



Virtualization on IBM System x and BladeCenter Servers (4:58)

More on the Web

- X-Architecture info on IBM.com

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

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 complexity 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.

Manage Complexity and Growth

The proliferation of servers, along with their management and asset control, can make it difficult to manage your data center. Proactive, integrated tools—for tracking and deploying assets, optimizing performance, and enabling remote main-

tenance—provide a single, consistent interface so you can better manage your IT. An intelligent system design that includes multiple layers of redundancy, and memory protection combined with advanced availability tools, helps keep your systems up and running. And with the ability to scale up to 64 cores on rack mount servers or add blades on demand, you can grow as needed to create a dynamic and scalable infrastructure. With a data center that's easier to manage, you can focus on growing your business.

More on the Web

- Managing complexity and growth

Go Green and Save

Managing energy in your data center is a growing concern—because of the increasing number of servers, the incremental heat they generate, and ultimately, the rising cost of energy. With System x and BladeCenter servers, IBM can help you cut costs with technologies that not only increase performance per watt, but also help you budget, plan, and control your power usage. And, by consolidating and virtualizing on IBM System x and BladeCenter servers, you can increase the utilization of your hardware and decrease the number of physical assets you need to watch over. This translates into real dollar savings through better energy conservation and IT resource usage across the data center.

More on the Web

- Systems Director Active Energy Manager
- Green IT

Virtualizing on System x and BladeCenter Servers

Virtualizing on System x and BladeCenter servers allows you to create a highly flexible infrastructure that can quickly and easily adapt to business changes. System x and BladeCenter supports a broad range of virtualization solutions from industry leading partners, including VMware, Microsoft, Red Hat, and Novell, which allows you to consolidate and simplify your heterogeneous workloads on a single platform. Together, virtualization and System x and BladeCenter servers help reduce costs, increase business agility and boost IT resiliency.

More on the Web

- System x & BladeCenter virtualization

IBM System x Essentials

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:

x3755 review in The Inquirer.net

> *"This scalable yet powerful system (x3755) is ideal for users requiring large memory bandwidth and high floating-point performance at an affordable price."*

x3500 review in Serverwatch.com

> *"IBM x3500, No Ordinary Workgroup Server... Since the x3500 pricing starts very low, it's amazing to find such wonderful features."*

x3200 review in Digital Journal Online

> *"All server manufacturers claim their products are the best and promise a lot, but rarely does a product fulfill all it offers in ads. Among exceptions is the IBM x3200."*

IBM BladeCenter Essentials

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. You need to make the RIGHT choice. BladeCenter is the RIGHT choice... OPEN, GREEN and EASY.

Your business is dynamic. A one-size-fits-all solution simply won't work. 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

More on the Web

- Article on racks vs. blades in NetworkWorld Magazine

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 running. 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 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

OPEN

You want a flexible business foundation that is both open and innovative. BladeCenter delivers. BladeCenter Open Fabric offers the broad, fast, and reliable networking and storage connections that work with your existing network and storage infrastructure. With BladeCenter Open Fabric, you can match your data center needs with the appropriate interconnect, selecting from multiple I/O fabrics. You can choose from a myriad of blade offerings de-

More on the Web

- Blade Open Specification
- Blade.org

fined by Blade.org and created by other members of the most extensive ecosystem for blade solutions.

EASY

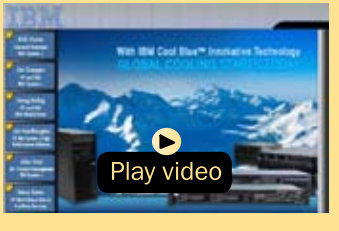
You want deployment simplicity and performance without tradeoffs. The Advanced Management Module allows blades to be managed at the chassis or rack level. The BladeCenter Open Fabric Manager will automate the deployment and failover of blades and is compatible with all switches, blades, and chassis.

GREEN

You need control of your power and cooling environment. You want to minimize environmental impacts. IBM BladeCenter offers energy-efficient designs and powerful Cool Blue tools to help plan, monitor, control, and allocate power consumption and cooling. All this helps you be more environmentally responsible. For example, BladeCenter E delivers 31 percent

More on the Web

- Systems Director Active Energy Manager
- Cool Blue energy management
- Cool Blue energy efficiency
- Power Configurator
- Green IT



Cool Blue—Start Global Cooling Today

greater density and 11 to 19 percent better energy efficiency than other blades.

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 mid-size 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 mid-size customers and the IBM Business Partners that help

More on the Web

- IBM Express Advantage on PartnerWorld
- Express Seller Toolkit on PartnerWorld

service them. Express offerings retain the functions and features sought most by mid-size 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. In doing so, these product lines are offered at lower prices, are easier to order in pretested configurations, and are easier to install.

2

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 Web Site

IBM maintains a Web site 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 ebook, 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 ebook is your personal "guide" to the PartnerWorld Web site. 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.

More on the Web

- IBM PartnerWorld ("Getting Started")
- IBM PartnerWorld Web site home page
- IBM PartnerWorld news and newsletters
- PartnerWorld membership levels
- Help with your user ID and password

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.)

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 three ways you can get the System x education you need.

The Campus

The Campus is a Web-based directory of both sales and technical educational resources for many different IBM products. When you arrive at The Campus home page (after entering your PartnerWorld user ID and password), you can select from several different options in the "System Storage" window. You will then be taken to a list of educational opportuni-

More on the Web

- System x sales education from The Campus
- System x technical education from The Campus
- BladeCenter sales education from The Campus
- BladeCenter technical education from The Campus

ties (books, CDs, live classroom education, etc.) pertinent to the topic you select.

The Campus provides you with road maps and other tools that help you select the educational offering appropriate for your needs. When you find what you need, you can order or register for education online.

Education Listed on PartnerWorld

IBM PartnerWorld posts various educational opportunities as 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.

More on the Web

- System x education listings on PartnerWorld
- BladeCenter education listings on PartnerWorld

Know Your IBM (KYI)

Know Your IBM is a global, permission-based interactive marketing and selling resource for Business Partners. It provides customized, online education modules focusing on product and solution areas where participating Business Partners are targeting greater growth. The education helps increase understanding and awareness of the key features and business benefits of IBM products, solutions, and offerings. Incentives

More on the Web

- Know Your IBM training modules

offered in conjunction with Know Your IBM are designed to motivate sales professionals to complete the education modules and provide rewards for performance.

SystemsConnect eXpert Program

SystemsConnect eXpert is a worldwide portal for easily locating System x and BladeCenter certification and education. This program provides Business Partners with easy-to-follow, flexible road maps to advanced certification while helping you remain current on those urgent skills needed in the business world today.

There are tools to help you track your certification achievements as you progress through our technical and sales training programs leading to advanced certifications. Start now to grow your skills and fully realize the power of knowledge by using this program to:

More on the Web

- SystemsConnect eXpert Program

- Gain deeper skills faster
- Track your certification progress
- Take education on current IBM initiatives
- Actively maintain current skill levels
- Join a community of Business Partner experts

To receive the benefits of this program you must have passed initial IBM System x and BladeCenter certifications—technical (071) or sales (076).

IBM Professional Certification Program

The IBM Professional Certification program offers a business solution for skilled IT professionals who seek to develop and demonstrate their expertise to the world. It's designed to validate your skills and demonstrate your proficiency in the latest IBM technology and solutions. It helps to make certain that you have the capability to perform role-related tasks and activities at a specified level of competence. The program is beneficial for those who wish to validate their skills, as well as for companies that wish to ensure certain performance levels for their employees.

More on the Web

- IBM Professional Certification info

IBM Professional Certifications are associated with an individual, not a company or an organization. The target audience for certification includes employees of Business Partner firms, customers, IBM employees, and independent consultants who sell, support, or service IBM products.

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.
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.

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 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.

More on the Web

- System x performance benchmarks
- BladeCenter performance benchmarks

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,

More on the Web

- System x and BladeCenter success stories

Customer Testimonials (Multiple videos)

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.

Sources for Competitive Marketing Information

IBM maintains a Web site 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 e-mail), which is updated regularly and is the most extensive source of competitive information. Be sure you also sign up to automatically receive e-mail notification (along with the new password you will need) when a new version of the tool is posted.

More on the Web

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

More on the Web

- Playbook for System x & BladeCenter

Web Collage (for your Web site)

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 content from ibm.com to their own Web sites. IBM has teamed with Web Collage, Inc. to provide the capability for Premier, Advanced, and Member level PartnerWorld participants to receive Web content dynamically delivered into their Web sites.

More on the Web

- Web Collage

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 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.

More on the Web

- Configurator tools

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 link 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 what OS is going to be deployed on the hardware with your customers. 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 may be 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

- Software accessories

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 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.

More on the Web

- Storage products for System x and BladeCenter servers on IBM.com

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 mid-size 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 effectiveness 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.

More on the Web

- Service offering info on PartnerWorld

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

More on the Web

- Attach Connector cross selling tool

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.

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.

For example, the IBM BladeCenter Solution for Bioinformatics offers a set of open source applications and tools that are optimized for price and performance. The applications and tools are enabled by PowerPC server blades running in a BladeCenter that is optimally-configured for a bioinformatics envi-

More on the Web

- System x turn-key solutions

ronment. The blades are two-way, 64-bit processors that run the Linux operating system.

For complete information on all System x solutions, follow the link provided in the "More on the Web" box.

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 & 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, multinational corporation, acquiring tens of thousands of PCs for offices 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.

More on the Web

- IBM Global Financing

System x HPC Cluster Solutions

A cluster is defined as a multi-server system comprised of interconnected computers and associated networking and storage devices that are unified via systems management and networking software to accomplish a specific purpose. In short, a cluster provides "commodity-level super computing" to meet the needs of high performance computing (HPC) applications.

System x high performance computing clusters are IBM's HPC offerings to the marketplace (computer-aided engineering, EDA, oil & gas, life sciences, financial services, public sector, etc.). IBM has long dominated the HPC marketplace. System x servers are used as "compute nodes" to build IBM clusters, especially the dual-socket systems (rack-mount or blade), along with industry-leading, third-party/OEM components.

More on the Web

- HPC clustering sales kit
- IBM System Cluster 1350

IBM is now very actively pursuing the "departmental/workgroup" clusters space. In addition to IBM's flagship Linux clusters offering (the IBM System Cluster 1350), IBM is working with Microsoft's Windows Computer Clusters Server, a cluster operating system from Microsoft, and selling/assembling/implementing these clusters entirely through our Partners.

Technical Support for Business Partners

Technical sales support from IBM provides Business Partners with extensive pre-sales support through the PartnerWorld program on-line 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 technical sales support, as well as Competeline for win strategies and competitive information. 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:

More on the Web

- Contact Techline
- Technical Sales Library
- PartnerWorld technical resources & support

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

More on the Web

- Overview of all System x "tower" servers

System x servers are divided into three groups: tower servers, rack-mount servers, and enterprise servers. Let's take a look at each.

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

The IBM System x3200 (Figure T.1) can help lower your IT costs throughout its business lifecycle. The x3200 is not only affordable to purchase, but it's also easy to manage and keep up to date.

Specifications

Form factor/height	Tower/5U
Processor (L2 cache/ CPU GHz/front-side bus MHz max)	Quad-Core Intel Xeon (2x4 MB/2.13 GHz/1066 MHZ), Dual-Core Intel Xeon (4 MB/up to 2.4 GHz/1066 MHz), Intel Pentium D (dual-core) (2x2 MB/up to 3.4 GHz/800 MHz) or Intel Pentium 4 (1 MB/3.2 GHz/800 MHz)
Number of processors (std/max)	1/1
Memory (max)	Up to 8 GB DDR II 667 MHz
Expansion slots	3 PCI and 2 PCI-Express (x8, x1) Dedicated Remote Supervisor Adapter II slot Slotless hardware RAID-0, -1
Disk bays (total/hot-swap)	Four 3.5” simple-swap or hot-swap Serial ATA hard disk drives (HDDs) or four 2.5” or 3.5” hot-swap Serial Attached SCSI hard disk drives
Maximum internal storage	Up to 1.2 TB Serial Attached SCSI (SAS) HDDs or up to 3 TB Serial ATA HDDs
Network interface	Integrated Gigabit Ethernet
Hot-swap components	Hard disk drives, power supplies (model dependent)
RAID support	Integrated hardware RAID-0, -1 (model dependent) Optional upgrade to RAID-5 and RAID-6
Systems management	IPMI 1.5-compliant mini-BMC, IBM Director, Alert Standard Format 2.0, IBM ServerGuide, optional Remote Supervisor Adapter II and optional Remote Deployment Manager
Operating systems supported	Microsoft Windows Server 2003 Standard Edition/Enterprise Edition, Windows Small Business Server 2003, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Novell NetWare, IBM OS 4690
Limited warranty	1-year or 3-year onsite limited warranty (model dependent)

- x3200 details on PartnerWorld
- x3200 details on IBM.com
- x3200 competitive info on COMP

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

With unprecedented system availability, the x3200 can help you maximize uptime for your file and print or network infrastructure applications. Select SATA, near-line SATA or Serial Attached SCSI hard disk drives (HDDs) depending on your reliability requirements. If a hard disk drive or power supply fails, the x3200 can stay up and running with redundant power supplies and hot-swap SATA and SAS HDDs.

Standard on select models, integrated hardware RAID-0 or -1 provides protection for your business-critical data. Optional upgrades to RAID-5 or tape backup solutions are also available.

The x3200 helps minimize management costs for distributed or remote applications. It supports industry-standard, IPMI-based systems management and the IBM Remote Supervisor Adapter II for advanced hardware management—enabling your IT staff to do more with less.

Here are some quick x3200 facts:

- Affordable uni-processor tower server for medium-size businesses or distributed large enterprises
- More availability and management features than other systems in its class
- Quad-core and dual-core Intel Xeon processors deliver high performance.

x3200 M2

The IBM System x3200 M2 (Figure T.2) is an affordable, single-socket tower server that offers more performance, configuration flexibility, and availability features than many other servers in its class. From network infrastructure to distributed

Specifications

Form factor	Tower/5U (rack mountable)
Processor (CPU GHz/L2 cache/front-side bus	Intel Xeon (quad-core) up to 2.83 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 MHz
Expansion slots	2 PCI (32-bit/33 MHz), 2 PCI-Express (x8, x1), optional PCI-X, dedicated Remote Supervisor Adapter II SlimLine slot, slotless hardware RAID-0, -1
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 (HDDs)
Maximum internal storage	Up to 1.17 TB Serial Attached SCSI (SAS) HDDs or up to 3.0 TB Serial ATA (SATA) HDDs
Network interface	Integrated Gigabit Ethernet
Power supply (std/max)	400W 1/1 or 430W hot-swap redundant 2/2 (model dependent)
Hot-swap components	Hard disk drives; power supplies (model dependent)
RAID support	Integrated hardware RAID-0, -1 and optional upgrade to RAID-5
Ports	Front: two USB; Rear: four USB, one Ethernet, two serial, one parallel, video and management Ethernet
Systems management	IPMI 2.0-compliant mini-BMC2, IBM Director, Alert Standard Format 2.0, IBM ServerGuide, optional Remote Supervisor Adapter II SlimLine and optional Remote Deployment Manager
Operating systems supported	Microsoft Windows Server 2003 Standard Edition/Enterprise Edition, Windows Small Business Server 2003, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Novell NetWare, IBM OS 4690

- x3200 M2 details on PartnerWorld
- x3200 M2 details on IBM.com
- x3200 M2 competitive info on COMP

Figure T.2. IBM System x3200 M2 at a glance (and links to more detail).

applications, to front-end workloads, the x3200 M2 is designed to meet a wide range of business needs—and help you adapt to changing business requirements.

For performance that fits your processing requirements, the x3200 M2 offers the latest quad-core or dual-core processors. Providing up to 3.0 TB of disk storage, you can configure up to eight 2.5” hot-swap SAS drives for added flexibility and performance. Integrated slotless hardware RAID-0, -1 and internal tape backup support help protect your valuable data. Optional RAID-5 support is available for greater reliability, without consuming valuable adapter slots.

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

Here are some quick x3200 M2 facts:

- Manage growth and risk with new technologies that deliver configuration flexibility, data protection, and application performance
- Manage complexity with advanced monitoring capabilities that include integrated and remote management options
- Standard scalability and reliability features deliver high levels of system availability—at a value price.

x3400

The IBM System x3400 (Figure T.3) is an excellent low-cost solution for growing businesses or branch offices that rely on 24x7 availability and mission-critical applications. Op-

Specifications

Form factor/height	Tower/5U
Processor (max)	Dual-Core Intel Xeon Processor 5120 up to 1.83 GHz and up to 1333 MHz front-side bus or Quad-Core Intel Xeon
Processor	E5430 up to 2.66 GHz
Number of processors (std/max)	1/2
L2 cache	2x2 MB (dual-core) or 2x4 MB (quad-core)
Memory (std/max)	1 GB/32 GB Fully Buffered DIMM 667 MHz via 8 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	4.0 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 Director; optional Remote Supervisor Adapter II SlimLine and IBM ServerGuide
Operating systems supported	Microsoft Windows Server 2003, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Novell Open Enterprise Server, VMware Infrastructure, SCO UnixWare, SCO Open Server

- x3400 details on PartnerWorld
- x3400 details on IBM.com
- x3400 competitive info on COMP

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

tional 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. Optional redundant features help maintain business-critical availability and uptime.

Select configurations of the x3400 are part of the IBM Express Portfolio designed and priced to meet the needs of mid-size businesses. Reliable and easy to manage, Express models/configurations vary by country.

Here are some quick x3400 facts:

- Value-priced, dual-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.

x3500

The IBM System x3500 (Figure T.4) delivers unprecedented performance and reliability for demanding distributed en-

Specifications

Form factor	Tower/5U
Processor (max)	Dual-Core Intel Xeon Processor 5160 up to 3.0 GHz and up to 1333 MHz front-side bus or Quad-Core Intel Xeon Processor X5460 up to 3.16 GHz and up to 1333 MHz frontside bus
Number of processors (std/max)	1/2
L2 cache	2x2 MB (dual-core) or 2x4 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, 4.0 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 Director; optional Remote Supervisor Adapter II SlimLine and IBM ServerGuide
Operating systems supported	Microsoft Windows Server 2003, Red Hat Linux Enterprise Server, SUSE Linux Enterprise Server, Novell NetWare Open Enterprise Server, VMware Infrastructure, SCO OpenServer, SCO UNIXware

- 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).

vironments that rely on 24x7 availability of mission-critical applications. 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.

With the x3500 take advantage of virtualization. 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 Portfolio, designed and priced to meet the needs of mid-size businesses. Reliable and easy to manage, Express models/configurations vary by country.

Here are some quick x3500 facts:

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

Rack-Mount Servers

In this section, we explore the IBM System x rack servers. These are designed compactly to fit into industry-standard 19-inch server racks that save valuable data center floor space.

More on the Web

- Overview of all System x rack-optimized servers

x3250

The IBM System x3250 (Figure R.1) is a single-socket server that is easy to deploy, manage, and service. It provides outstanding performance and reliability at an entry-level price. The x3250 offers remote monitoring and alerting capabilities that provide strong systems management.

Designed for high-performance, quad-core, and dual-core 64-bit processors, the x3250 can optimize performance of your Web and network infrastructure. For a performance boost, choose models with Intel Xeon or Intel Pentium D processors, while those running less demanding applications may prefer the Intel Celeron processor.

Serial Attached SCSI (SAS) HDDs and PCI-Express ensure even greater integrated I/O performance and compatibility with next-generation devices for added long-term investment protection.

Here are some quick x3250 facts:

- Lower costs with ease of management, deployment, and service

Specifications

Form factor/height	Rack (22" depth)/1U
Processor (L2 cache/CPU GHz/front-side bus MHz max)	Intel Xeon (quad-core) (8 MB/up to 2.4 GHz/1066 MHz) or Intel Xeon (dual-core) (2 MB or 4 MB/up to 2.6 GHz/1066 MHz) or Intel Pentium D (dual-core) (1 MB/up to 1.8 GHz/800 MHz) or Intel Celeron (256 KB/2.93 GHz/533 MHz)
Number of processors (std/max)	1/1
Memory (std/max)	512 MB or 1 GB/8 GB DDR II 667 MHz via 4 DIMM slots
Expansion slots	2 PCI-Express (x8)
Disk bays (total/hot-swap)	Up to two 3.5" simple-swap Serial ATA or two 3.5" hot-swap Serial ATA or Serial Attached SCSI (SAS) hard disk drives, or four 2.5" hot-swap SAS
Maximum internal storage	1.0 TB Serial ATA or 600 GB Serial Attached SCSI
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	350W 1/1
Hot-swap components	Serial ATA and Serial Attached SCSI hard disk drives
RAID support	Integrated hardware RAID-0, -1 (model dependent) and RAID-5 optional
Ports	Front: two USB; Rear: serial, two USB, two Ethernet, video, mouse, keyboard
Systems management	IPMI 1.5-compliant mini-BMC, Automatic Server Restart, IBM Director, IBM ServerGuide, Remote Deployment Manager, IBM Wake on LAN, optional Remote Supervisor Adapter II SlimLine
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Novell Open Enterprise Server

- x3250 details on PartnerWorld
- x3250 details on IBM.com
- x3250 competitive info on COMP

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

- Maximize and protect your IT investment with resiliency and flexibility
- A range of processor choices offering multiple levels of price/performance.

x3250 M2

The IBM System x3250 M2 (Figure R.2) is a 1U, 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 that consumes low power, can be dedicated to a single application, and is priced right for your budget—now and in the future.

Designed for infrastructure applications like firewall, security, disaster recovery, name server, authentication, credit card processing, e-mail, domain controller, and more, the x3250 M2 leverages the latest dual-core and quad-core processor technology.

An excellent appliance box, 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.

Here are some quick x3250 M2 facts:

- Maximize return on IT investments with a low entry price, small form factor, and less power consumption
- Manage risk with enhanced reliability features and full remote management

Specifications

Form factor/height	1U rack server
Processor	Intel Xeon3300 (quad-core) (up to 2.66 MHz/12 MB/1333 MHz) or Intel Xeon 3100 (dual-core) (up to 3.0 GHz/6 MB/1333 MHz) or Intel Core 2 Duo E4600 (up to 2.4 GHz/1 GB/800 MHz) or Intel Celeron (up to 2.0 GHz/512 KB/800 MHz)
Number of processors (std/max)	1/2
Memory (max)	1 GB standard/8 GB maximum 667 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,two 3.5" hot-swap SAS/SATA or four 2.5" hot-swap SAS hard disk drives
Maximum internal storage	1.5 TB SATA or 600 GB SAS
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	350W 1/1
Hot-swap components	Hard disk drives
RAID support	Integrated hardware RAID-0,-1 standard; RAID-5 optional
Systems management	IPMI 2.0-compliant mini-BMC2, optional Remote Supervisor Adapter II SlimLine
Operating systems supported	Microsoft Windows Server2003 StandardEdition/Enterprise Edition/Web Edition R2, WindowsSmallBusiness Server 2003 R2, Red Hat Enterprise Linux5, SUSELinux Enterprise Server 10, Novell NetWare 6.5
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.2. IBM System x3250 M2 at a glance (and links to more detail).

- Manage complexity of IT with greater flexibility to meet a wide range of stateless infrastructure needs.

x3350

The IBM System x3350 (Figure R.3) 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 uncompromised availability features. The x3350 is ideal for deployments that require a dedicated server, when the application vendor doesn't support virtualization, or when the application doesn't scale to take advantage of multiple sockets.

The x3350 has the affordability of a single-socket rack server, but the reliability features of a dual-socket rack server. Full BMC for enhanced system management and optional redundant power supplies give the x3350 the reliability and availability fetures typically only found on more expensive servers.

Here are some quick x3350 facts:

- Go green and save with affordable, energy-efficient, high-performance quad-core computing
- Manage growth and risk with performance, 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 3.0 GHz/6 MB/1333 MHz) or Intel Xeon (quad-core) (up to 2.83 GHz/12 MB/1333 MHz)
Number of processors (std/max)	1/1
Memory (std/max)	1 GB or 2 GB standard/8 GB maximum, PC2-5300 DDR II 667 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-swat Serial ATA or Serial Attached SCSI (SAS) hard disk drives
Maximum internal storage	Up to 1.5 TB SATA or 600 GB SAS
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	450 W
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, optional Remote Supervisor Adapter II SlimLine
Operating systems supported	Microsoft Windows Server 2003 Standard Edition/Enterprise Edition/Web Edition, Windows Small Business Server 2003, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Novell NetWare 6.5

- x3350 details on PartnerWorld
- x3350 details on IBM.com
- x3350 competitive info on COMP

Figure R.3. 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.4) 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 bandwith x16 PCI Express slot for maximum I/O adapter throughout.

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 X5472 up to 3 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)	2x2 GB/64 GB Fully Buffered DIMM 667 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 Windows Server 2003, Red Hat Linux, SUSE Linux
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.4. IBM System x3450 at a glance (and links to more detail).

x3455

The IBM System x3455 (Figure R.5) 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" 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. As well, 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 risk 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)	2x 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 ibm.com/systems/x 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 2008, Red Hat Linux, SUSE Linux
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.5. IBM System x3455 at a glance (and links to more detail).

Specifications

Form factor/height	Rack/1U
Processor (max)	Dual-Core Intel Xeon Processor 5160 up to 3 GHz and up to 1333 MHz front-side bus or Quad-Core Intel Xeon Processor X5460 up to 3.16 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
L2 cache	2x2 or 2x6 MB (dual-core) and 2x6 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 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 for x86, Integrated Service Processor, Diagnostic LEDs, drop-down light path diagnostics panel, Automatic Server Restart, optional Remote Supervisor Adapter II SlimLine, IBM Director, IBM ServerGuide and optional Remote Deployment Manager
Operating systems supported	Microsoft Windows Server 2003, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, TurboLinux Enterprise Server, Novell NetWare and VMware ESX Server
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.6. IBM System x3550 at a glance (and links to more detail).

(Figure R.6) 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" 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 for x86 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.

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 a new design and tools for optimized power management.

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-

Specifications

Form factor/height	Rack/2U
Processor (max)	Dual-Core Intel Xeon Processor 5160 up to 3 GHz and up to 1333 MHz front-side bus or Quad-Core Intel Xeon Processor X5460 up to 3.16 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	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 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 for x86, Integrated Service Processor, Diagnostic LEDs, drop-down light path diagnostics panel, Automatic Server Restart, optional Remote Supervisor Adapter II SlimLine, IBM Director, IBM ServerGuide and optional Remote Deployment Manager
Operating systems supported	Microsoft Windows Server 2003, Windows 2000/Advanced Server, Red Hat Linux, SUSE Linux, Novell NetWare, VMware ESX Server, Solaris 10 (planned)
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).

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 for x86 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 for x86 help keep your server cool. The result? Run multiple workloads on a two-socket server—without running out of IT funds.

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 T

The IBM System x3650 T (Figure R.8) takes carrier-grade servers and next-generation networks to new levels. Built especially for network equipment providers and service pro-

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, Red Hat Enterprise Server, SUSE Linux Enterprise Server

- x3650 T details on PartnerWorld
- x3650 T details on IBM.com
- x3650 T competitive info on COMP

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

viders, 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 life cycle, providing businesses investment protection.

Here are some quick x3650 T facts:

- 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.9) provides you the confidence to deploy business applications that can help you get to market faster, build better products, and better understand your customers.

These applications require memory intensive performance, and the x3655 delivers. With features such as quad-core processors, 16 available DIMMs with up to 64 GB of DDR II

Specifications

Form factor/height	Rack/2U
Processor (max)	Dual-Core Intel Xeon Processor 5130 2.0 GHz
Number of processors (std/max)	1/2
Cache (max)	2x2 MB
Memory (std/max)	1 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/hot-swap)	8/8
Maximum internal storage	1.8 TB hot-swap SAS, 15 TB hot-swap SAS (external)
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-1/RAID-5
Systems management	IBM PowerExecutive (included with IBM Director), Integrated Service Processor, Diagnostic LEDs, drop-down light path diagnostics panel, Automatic Server Restart, optional Remote Supervisor Adapter II SlimLine, IBM Director, ServerGuide and optional Remote Deployment Manager
Operating systems supported	Microsoft Windows Storage Server 2003 R2 Standard or Enterprise Edition

- x3655 details on PartnerWorld
- x3655 details on IBM.com
- x3655 competitive info on COMP

Figure R.9. IBM System x3655 at a glance (and links to more detail).

memory and robust I/O, customers can configure to meet their needs. And IBM Systems Director Active Energy Manager delivers advanced control to help monitor power usage and achieve decreased infrastructure power and cooling costs. Grow your compute power without growing your data center.

Keep it simple and protect your data with light path diagnostics, hot-swap and redundant components, and the optional Remote Supervisor Adapter II SlimLine. With the x3655, 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 breakthrough performance for general business computing at an entry price point with Quad-Core AMD Opteron processors. With the innovative IBM CPU Pass Thru card delivering near linear performance and flexible configurations, the x3755 is uniquely advantaged in the industry. For instance, the x3755 configured with three processors plus the CPU Pass Thru card outperformed the HP DL585G2 by 27.7 percent configured with four processors.

The x3755 excels at high-speed memory access—critical for mission-critical business applications and virtualized environments. Delivering the memory speed through Xcelerated Memory Technology, the x3755 helps achieve low latency and high-speed access to memory data, especially for large memory configurations. It delivers up to 25 percent faster memory throughput, resulting in up to 15 percent better system performance. The x3755 provides outstanding memory price performance for general purpose computing environments.

Here are some quick x3755 facts:

- Achieve outstanding performance at excellent starting prices
- Outstanding leadership with IBM Xcelerated Memory Technology
- Deliver superb performance per watt with this cost-effective solution.

x3800

The IBM System x3800 (Figure E.2) delivers outstanding performance, high availability, and manageability that you de-

Specifications

Form factor/height	4U
Processor (max)	Quad-Core AMD Opteron Model 8360 SE (up to 2.5 GHz)
Number of processors (std/max)	1/4 or 2/4
Cache (max)	1 MB L2
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 (half-length)
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 2003 (32-bit/64-bit), Red Hat Enterprise Linux 4 (32-bit/64-bit), SUSE Linux Enterprise Server 9.0 (32-bit/64-bit), VMware ESX Server 3.0
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).

Specifications

Form factor	Tower or 7U rack
Processor (max)	Intel Xeon Processor MP up to 3.66 GHz (single-core) and 3.50 GHz (dual-core)/667 MHz front-side bus
Number of processors (std/max)	1 or 2/4
Cache (max)	1 MB L2 per processor (single-core) and up to 2 MB L2 (dual-core) and up to 16 MB L3 (dual-core)
Memory (max)	1 GB or 2 GB/64 GB PC2-3200 DDR II SDRAM
Disk bays (total/hot-swap)	12/12 3.5" Serial Attached SCSI (SAS)
Maximum internal storage	3.6 TB SAS (supports 300 GB SAS HDDs)
I/O slots (total/hot-swap)	6/6, two Active PCI-X 2.0/266 MHz and four PCI-Express x8
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	775W 2 or 3/3 hot-swap (N+1)
Hot-swap components	Power supplies, fans, memory, hard disk drives and PCI-Express and PCI-X adapters
RAID support	RAID-0, -1, -5, -10, -1E, -50, -60 optional (ServeRAID-8i)
Systems management	Alert on LAN 2, Automatic Server Restart, IBM Director, IBM ServerGuide, Remote Supervisor Adapter II SlimLine optional, light path diagnostics (independently powered), Predictive Failure Analysis on processors, VRMs, fans, power supplies and memory, Wake on LAN
Operating systems supported	Microsoft Windows Server 2003 (Standard and Enterprise editions), Red Hat Enterprise Linux and SUSE Enterprise Linux Server, VMware Infrastructure, Novell Open Enterprise Server

- x3800 details on PartnerWorld
- x3800 details on IBM.com
- x3800 competitive info on COMP

Figure E.2. IBM System x3800 at a glance (and links to more detail).

mand along with advanced, integrated technologies that help protect your IT investment—features that you would expect in more high-end systems, but at an affordable price.

The x3800, an IBM System x tower-based system designed with the X3 technology chipset, delivers the third generation of mainframe-inspired IBM X-Architecture innovation. Driving mission-critical applications such as Enterprise Resource Planning, collaboration (IBM Lotus Notes and Microsoft Exchange e-mail applications), terminal serving, and database applications, the x3800 excels at performing transaction-intensive, traditional back-office and branch-office functions.

Here are some quick x3800 facts:

- Combines 64-bit breakthrough, four-processor performance with up to 3.6 TB of high-speed internal storage
- Supports high-performance, dual-core Intel Xeon Processors MP and runs 32- and 64-bit applications simultaneously, providing headroom and potential investment protection
- High-availability features such as three levels of memory protection and optional advanced systems management help provide high reliability
- Supports new PCI-Express I/O technology while maintaining legacy PCI-X 2.0 compatibility.

x3850 M2

Built on the next generation of X-Architecture servers, the IBM System x3850 M2 (Figure E.3) takes performance, efficiency, and reliability to the next level. Featuring an un-

Specifications

Form factor/height	Rack/4U per chassis
Processor (max)	Intel Xeon Series 7200 and 7300 up to 2.93 GHz (quadcore)/ 1066 MHz front-side bus
Number of processors (std/max)	2/4 per chassis (optional 2, 3, 4 chassis support)
Cache (max)	Up to 8 MB (2x4 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 Memory)
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 2003 (Standard, Enterprise and Datacenter editions), Red Hat Enterprise Linux and SUSE Enterprise Linux Server, VMware Infrastructure, Solaris 10

- x3850 M2 details on PartnerWorld
- x3850 M2 details on IBM.com
- x3850 M2 competitive info on COMP

Figure E.3. IBM System x3850 M2 at a glance (and links to more detail).

matched 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 4-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 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 upfront 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
- New scalability option and embedded hypervisor option which leverage the design flexibility of the X4 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.4) 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 application and virtualization services.

The x3950 M2 provides an uncomplicated, cost-effective, and highly flexible solution. With the ability to scale up to 64 cores while maintaining balanced performance between the 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 organization's specific application require-

Specifications

Form factor	Rack/4U per chassis
Processor	Intel Xeon Processor 7200 and 7300 series up to 2.93 GHz (quad-core)/1066 MHz front-side bus
Number of processors	2/4 per chassis (optional 2, 3, 4 chassis support)
Cache (max)	Up to 8 MB (2x4 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 2003 (Standard, Enterprise and Datacenter editions), Red Hat Enterprise Linux and SUSE Enterprise Linux Server, VMware Infrastructure

- x3950 M2 details on PartnerWorld
- x3950 M2 details on IBM.com
- x3950 M2 competitive info on COMP

Figure E.4. IBM System x3950 M2 at a glance (and links to more detail).

ments. The system's optimized design improves software features and hardware functionality. Deploying multi-chassis configurations is now simpler and easier, helping organizations reduce the time it takes to deploy a new chassis or boot a system. The x3950 M2 accommodates easier firmware upgrades and can help make updates easier and more efficient.

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.

4

BladeCenter Product Quick Reference

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

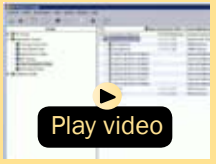
What Is a BladeCenter Blade Server?

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 interconnecting 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 software 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.

More on the Web

- Overview of BladeCenter servers
- Info on Blade.org

More on the Web



IBM BladeCenter Configuration Manager Demo (4:46)

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 pro-

vide a number of common functions needed by the installed blades, the chassis, and the other modules. Modules include things like power supplies, systems management module, 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 mid-size offices and distributed environments. Building-in simplicity and economy, BladeCenter S is designed to get big IT results from the smallest IT staffs.

Specifications

Form factor	Rack/7U incorporates blade server bays and hot-swap storage high-availability midplane
Blade bays	Up to six 2-processor, and up to three 4-processor
Disk bays	Up to two 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	3 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
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

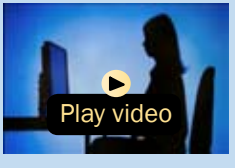


Figure C.1. IBM BladeCenter S chassis (and links to more detail).

Small enough to sit under your desk, the new BladeCenter S chassis makes it easy and cost-effective for small and mid-size businesses to obtain IT results at levels traditionally reserved for large enterprises. With six blade servers, 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, and Linux—and integrates the hardware and software most used by mid-size 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:

- 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 chassis (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 or more efficient in power and cooling compared to the HP c-Class chassis to run the same configuration in the data center.

Here are some quick BladeCenter E chassis 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.

Specifications

Form factor/height	Rack-mount chassis/7U
Blade bays	Up to 14
Switch modules	Four switch module bays
Power supply module	Up to four (hot-swap and redundant 2000W with load-balancing and failover capabilities)
Cooling modules	Two hot-swap and redundant blowers standard
Standard media	Optical drive accessible
Systems management hardware	One 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 Announcement Letter, Feb 06
- BladeCenter E chassis details on IBM.com
- BladeCenter E chassis competitive info on COMP

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

BladeCenter H Chassis

The powerful BladeCenter H (Figure C.3) delivers the performance customers need to make informed decisions. 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.

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.

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 loadbalancing and failover capabilities. Operating at 200-240V
Cooling modules	Two hot-swap and redundant blowers standard, additional fan packs on power supplies
Systems management hardware	Advanced Management Module standard; add an optional Advanced Management Module for redundancy
I/O ports	USB-based keyboard, video, mouse (KVM), Ethernet, USB
Standard media	Optical drive and two USB connections
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 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

- BladeCenter T chassis details on PartnerWorld
- BladeCenter T chassis Announcement Letter, Feb 06
- BladeCenter T chassis details on IBM.com
- BladeCenter T chassis competitive info on COMP
- BladeCenter T Compatibility Guide

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

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:

- 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 outstanding 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:

- 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 at a glance (and links to more detail).

- 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

- Increase network infrastructure performance with dual-core and quad-core Intel, AMD, and IBM POWER processor blades
- Dramatically increase high-speed connectivity and throughput with multi-terabit networking (more than 1.2 Tbps throughput on backplane) and 40 Gbps per blade server
- Improve 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 consolidate 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
- BladeCenter 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)

- Increase 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.

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 (TOE-capable), 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 (iBMC); 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).

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 S and E chassis.

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

The 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 hassles. 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.

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. Easily deployed and managed, the HS21 blade empowers organizations to function with more control

Specifications

Processor (max)	Dual-Core Intel Xeon up to 3 GHz or Quad-Core Intel Xeon up to 3.16 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 2x6 MB L2 (quad-core)
Memory (max)	Up to 16 GB with Fully Buffered DIMMs (internal) and up to 32 GB with Memory and I/O Expansion Unit
Internal hard disk drives	Up to two Small Form Factor (2.5") 10,000 rpm SAS hard disk drives installed on each blade (support for up to three hot-swap SAS drives with optional Storage and I/O blade)
Maximum internal storage	734 GB (with optional Storage and I/O blade)
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 system management processor
Operating systems supported	Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMWare Infrastructure, Microsoft Windows Server, Open Enterprise Server and SUN Solaris 10
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).

and higher efficiency—a reliable solution for enterprise environments.

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
- 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. With its expanded memory and reliable processing power, the HS21 XM delivers innovative solutions to organizations demanding high-level performance from blade servers.

Here are some quick HS21 XM facts:

- Expanded memory and new lower voltage processors enable more powerful blade performance
- Ideal platform for virtualization with VMware ESXi 3.5 Embedded Hypervisor

Specifications

Processor (max)	Dual-Core Intel Xeon up to 3 GHz or Quad-Core Intel Xeon up to 3 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 2x6 MB L2 (12 MB) (quad-core)
Memory (max)	Up to 32 GB with Fully Buffered DIMMs
Internal hard disk drives	One Small Form Factor (2.5") 10,000 rpm SAS hard disk drive (HDD) installed on each blade; or one to two optional internal 15.8 GB 2.5" Solid State Drives; or one optional IBM 4 GB or 8 GB Modular Flash Drive (or support for up to three hot-swap SAS drives with optional storage and I/O blade)
Maximum internal storage	587.2 GB (with optional SIO blade)
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	Red Hat Linux, SUSE Linux, VMware ESX Server, Windows Server, Open Enterprise Server (NetWare 6.5), SUN Solaris 10
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).

- Cool, "green" solution to help reduce energy costs
- Great for rack-to-blade migration for optimized efficiency.

HC10

The IBM BladeCenter HC10 (Figure H.4) ushers in revolutionary server-based computing technology for workstation applications by offering high security and manageability, while delivering outstanding graphics performance and full USB capability. Built-in features are ideal for engineering design applications (CAD), trading floor and other financial applications, geographic information systems (GIS) applications, distance collaboration, and more.

The HC10 is designed to provide hardware-based graphics compression and encryption that delivers performance and security. Encrypted USB signals are transmitted transparently over the TCP/IP network to a workstation device. No additional software or device drivers are required by customers for encryption and transmission of graphics and USB information over the network. This workstation solution is designed for Microsoft Windows.

Here are some quick HC10 facts:

- Security-rich features help protect critical business data
- A centralized data center simplifies management and helps lower TCO
- High performance and availability provide optimum business value

Specifications

Processor (max)	Dual-core Intel Core 2 Duo up to 2.66 GHz
Cache (max)	Up to 4 MB L2 shared
Memory (max)	Up to 8 GB
Disk bays	1
Maximum internal storage	60 GB 5400 rpm SATA hard disk drive
Network	Gigabit Ethernet (TOE-capable)
Graphics	NVIDIA Quadro NVS 120M Professional 2D Graphics adapter, NVIDIA Quadro FX 1600M Advanced 3D Graphics adapter
I/O and graphics transmission	BladeCenter I/O and Graphics Transmission Adapter
Systems management hardware	Integrated systems management processor
Operating systems preload	Microsoft Windows Vista Business Blade PC Edition (64-bit)
Operating systems supported	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Microsoft Windows Vista Business (32-bit/64-bit), Microsoft Windows Vista Enterprise (32-bit/64-bit), Microsoft Windows Vista Ultimate (32-bit/64-bit)
Limited warranty	1-year customer replaceable unit and onsite limited warranty

- HC10 details on PartnerWorld
- HC10 details on IBM.com
- HC10 competitive info on COMP

Figure H.4. IBM BladeCenter HC10 at a glance (and links to more detail).

- Accessibility from multiple locations and operating system compatibility provide business flexibility.

LS21

The LS21 blade server (Figure L.1) is a reliable, energy-efficient solution for mainstream enterprise applications. Tasks like e-mail and collaboration or Web serving require blade servers that will do the job efficiently without inflating power costs. The IBM BladeCenter LS21 is ideal for general purpose applications since it saves energy without sacrificing performance. When combined with the energy-efficient BladeCenter E chassis, it's the ultimate solution for power-constrained data centers.

Here are some quick LS21 facts:

- High-efficiency processors and an integrated memory controller help keep power consumption low while still providing the performance to run business-critical applications
- Low-power DDR II memory helps conserve even more energy
- IBM Systems Director Active Energy Manager allows IT managers to monitor and control how much power the server can use
- Solid state drives help boost reliability of a complete solution and further lower energy consumption.

LS41

The LS41 blade server (Figure L.2) is a high-density blade server delivering energy efficiency and innovative scalability; it's the right choice for memory-intensive applications, includ-

Specifications

Processor	AMD Opteron Model 2210EE, 2210HE, 2212, 2212HE, 2216HE, 2218, 2218HE, 2220 and 2222
Number of processors (std/max)	1/2
Cache	1 MB L2 per processor core
Memory	Up to 32 GB DDR II VLP memory
Internal hard disk drives	One SAS HDD
Maximum internal storage	73.4 GB internally; up to 293.6 GB with storage and I/O expansion blade installed
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
Operating Systems	Windows Server Standard/Enterprise Edition, Novell Open Enterprise Server, Red Hat Enterprise Server, Solaris 10, SUSE Linux Enterprise Server, VMware Infrastructure

- LS21 details on PartnerWorld
- LS21 details on IBM.com
- LS21 competitive info on COMP

Figure L.1. IBM BladeCenter LS21 at a glance (and links to more detail).

Specifications

Processor	AMD Opteron Model 8212, 8212HE, 8214, 8214HE, 8216HE, 8218, 8218HE, 8220, and 8222
Number of processors (std/max)	2/4
Cache	1 MB L2 per processor core
Memory	Up to 64 GB DDR II VLP memory
Internal hard disk drives	2 SAS HDDs
Maximum internal storage	146 GB internally; up to 367 GB with SIO installed
Network	4 integrated Gigabit Ethernet controllers
I/O upgrade	2 PCI-X expansion connectors and 1 PCI-Express expansion connector
Systems management	Integrated systems management processor
Operating Systems	Windows Server Standard/Enterprise Edition, Novell Open Enterprise Server, Red Hat Enterprise Server, Solaris 10, SUSE Enterprise Linux Server, VMware Infrastructure

- LS41 details on PartnerWorld
- LS41 details on IBM.com
- LS41 competitive info on COMP

Figure L.2. IBM BladeCenter LS41 at a glance (and links to more detail).

ing virtualization, database, and server consolidation. With features such as high-efficiency processors, integrated memory controller, and solid state drives, the LS41 maintains low power and thermal envelopes for enhanced energy efficiency. That's why the server can deliver consistently high performance to space- and power-constrained data centers.

Here are some fast LS41 facts:

- Features open, flexible configuration that can scale from a single-slot, one-processor server to a screaming double-slot, four-processor server in a snap
- Maintains a low power and thermal envelope for enhanced energy efficiency
- Integrates easily with the entire IBM BladeCenter family of products to protect overall investment.

POWER Blades

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

JS12 Express

For the perfect alternative to a traditional AIX, IBM i or Linux rack-mount and deskside server, the IBM BladeCenter JS12 Express blade server (Figure J.1) combined with a BladeCenter S chassis provides exceptional value and expandability in an attractively packaged and highly efficient design. And specifically 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

Specifications

Form factor	Single-wide blade server for BladeCenter E, BladeCenter S, Blade Center 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 offering: 2 GB (2 x 1 GB); 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 (1, 2, 4 GB DIMMs) 400 MHz (8 GB DIMMs)
Internal disk storage	Zero to two 73 or 146 GB 2.5" Serial Attached SCSI (SAS) 10K rpm disk drives Integrated RAID-0 or -1 standard 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 daughter cards, integrated connector for legacy daughter cards
Optional connectivity	4 Gbps Fibre Channel, 4X InfiniBand, iSCSI 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
Systems management	Integrated systems management processor, IBM Systems Director Active Energy Manager, light path diagnostics, Predictive Failure Analysis, Cluster Systems Management (CSM), Serial OverLAN, IPMI-compliant
Operating systems	AIX V5.3 or later; IBM i V6.1 or later; SUSE Enterprise Linux Server 10 for POWER (SLES10 SP1) or later; Red Hat Enterprise Linux for POWER Version 4.6 (RHEL4.6) 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).

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 Express 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, preconfigured 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 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:

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	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).

- 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

Powered by IBM POWER6 processor cores, the JS22 Express (Figure J.3) will bring significant rewards to clients who want a durable server solution for consolidating multiple applications and servers into a single BladeCenter transitioning from traditional rack servers to highly efficient blades, distributing Java and Web serving applications, running high performance computing (HPC) applications, and implementing commercial applications. The flexibility to use the leading-edge AIX (industrial-strength UNIX from IBM), i5/OS and Linux operating systems(OS)—concurrently if desired—broadens the application offerings available and increases the ways clients can put this power to work.

The BladeCenter JS22 Express server, a feature-rich, preconfigured blade, is the answer to meet the stringent requirements of small businesses for advanced technology at an attractive price. The JS22 Express delivers many new leading-edge IBM technologies—support for AIX Version 6, i5/OS1 V6 R1, and Linux operating systems; EnergyScale and PowerVM (formerly known as Advanced POWER Virtualization) technologies; and AltiVec SIMD acceleration functionality in a single,

Specifications

Form factor	Single-wide blade server for BladeCenter S
Processor cores	Four 64-bit 4.0 GHz POWER6
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, four 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
Networking	Integrated Virtual Ethernet adapter (IVE) Dual Gigabit and support for optional Dual Gigabit Ethernet daughter card
I/O upgrade	Integrated PCI Express connector integrated connector for legacy daughter cards
Optional connectivity	4 Gbps Fibre Channel, 10 Gigabit Ethernet, 4X InfiniBand, iSCSI Expansion Card
PowerVM Standard Edition	Virtual LAN, POWER Hypervisor, Micro-Partitioning, Virtual I/O Server with Integrated Virtualization Manager, Shared Dedicated Capacity, PowerVM Lx86
Systems management	Integrated systems management processor, IBM Director, light path diagnostics, Predictive Failure Analysis, Cluster Systems Management (CSM), Serial Over LAN, IPMI-compliant
Operating systems	AIX Edition: AIX V5.3 or later; i5/OS Edition: i5/OS1V6R1 or later; OpenPower Edition: SUSE Linux Enterprise Server 10 for POWER (SLES10 SP1) or later; RedHat Enterprise Linux for POWER Version 4.6 (RHEL4.6) or later

- JS22 Express details on PartnerWorld
- JS22 Express details on IBM.com
- JS22 Express competitive info on COMP

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

high-performance, yet cost-efficient blade server with features designed for high reliability. IBM Systems Director Active Energy Manager and browser-based Integrated Virtualization Manager software make it easier than ever to achieve increased utilization and energy efficiency by utilizing the PowerVM and EnergyScale capabilities of the system.

Here are some quick JS22 Express facts:

- Realize innovation with proven 6th generation IBM POWER technology for enhanced performance, efficiency, and reliability
- Cut costs and consolidate workloads with leadership PowerVM Editions as a built-in feature
- Go green by saving energy costs with innovative EnergyScale technology
- Manage growth, complexity, and risk through the flexibility of IBM BladeCenter design.

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.

QS21

The IBM BladeCenter QS21 (Figure Q.1) is based on the multi-core Cell Broadband Engine (Cell/B.E.) processor. When used to complement systems based on traditional processors, the QS21 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 new QS21 is a high performance blade that extends and deepens the IBM Power Architecture solution portfolio by providing a new level of parallelism and performance to targeted workloads. The Cell/B.E. multi-core processor architecture helps the QS21 accelerate key algorithms such as 3D rendering, compression, and encryption and enables companies to create and run highly visual, immersive, real-time

More on the Web

- BladeCenter Open Fabric Manager Launch on PartnerWorld
- BladeCenter Open Fabric info on IBM.com

Specifications

Form factor	Single-wide blade server for BladeCenter
Processors	3.2 GHz Cell/B.E. Processors
Number of processors	Two standard, each with one PPE core and eight SPE cores
L2 cache	512 KB per Cell/B.E. Processor, plus 256 KB of local store memory for each SPE
Memory	2 GB (1 GB per processor)
Internal disk storage	None
Networking	Dual Gigabit Ethernet
I/O upgrade	Serial Attached SCSI (SAS) daughter card connected via PCI-X (CFFv)
Optional connectivity	Dual-port InfiniBand 4x HCA connected via PCI-Express (SFF)
Operating systems	Red Hat Enterprise Linux 5.1
Warranty	1-year

- QS21 details on PartnerWorld
- QS21 details on IBM.com
- QS21 competitive info on COMP

Figure Q.1. IBM BladeCenter QS21 at a glance (and links to more detail).

applications. This performance offers significant potential benefit to companies in aerospace and defense, health care, life sciences, chemical and petroleum, financial markets, digital media, electronics, government, education, and other industries.

Here are some quick QS21 facts:

- Second generation blade system based on Cell Broadband Engine processors
- Potential 10x or greater performance acceleration of target workloads
- High-performance blade solution for graphics-intensive and high performance computing (HPC) applications.

QS22

The IBM BladeCenter QS22 (Figure Q.2) 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 orgsnizations to get information faster to facilitate important business decisions.

Part of the BladeCenter family of products, the new 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

Specifications

Form factor	Single-wide blade server for BladeCenter
Processors	3.2 GHz IBM PowerXCell 8i Processors
Number of processors	Two standard, each with one PPE core and eight 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 uFDM solid state flash drive
Networking	Dual Gigabit Ethernet
I/O upgrade	Serial Attached SCSI (SAS) daughter card connected via PCI-X (CFFv)
Optional connectivity	Dual-port InfiniBand 4x HCA connected via PCI-Express (SFF)
Operating systems	Red Hat Enterprise Linux 5.2 (upon availability)
Warranty	3-year

- QS22 info on PartnerWorld
- QS22 info on IBM.com
- QS22 competitive info on COMP

Figure Q.2. IBM BladeCenter QS22 at a glance (and links to more detail).

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 to companies in aerospace and defense, health care, life sciences, petroleum exploration, financial markets, digital media, electronics, government, education and other industries.

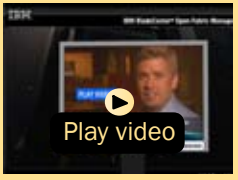
BladeCenter Open Fabric (I/O)

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 open standards and industry interoperability across 5 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.

More on the Web

- BladeCenter Open Fabric Manager Launch on PartnerWorld
- BladeCenter Open Fabric info on IBM.com
- BladeCenter Open Fabric Manager competitive info on COMP

More on the Web



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

IBM BladeCenter Open Fabric Manager (1:45)

BladeCenter Open Fabric Manager

IBM BladeCenter Open Fabric Manager allows you to simplify blade deployment, re-deployment, and expansion. This software can be deployed on both new and existing BladeCenter hardware through firmware upgrades, helping you protect your current BladeCenter investments and giving you the flexibility to deploy precisely the solution you need to help your business simplify I/O.

There are three BladeCenter Open Fabric Manager offerings:

- IBM BladeCenter Open Fabric Manager
- IBM BladeCenter Open Fabric Manager—Advanced upgrade
- IBM BladeCenter Open Fabric Manager—Advanced upgrade for IBM Director.

Learn more about all three offerings by following the links in the "More on the Web" box.

Ethernet Switch Modules

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

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 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.

More on the Web

- Cisco Catalyst Switch Module 3012 info on PartnerWorld
- Cisco Catalyst Switch Module 3012 info on IBM.com

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 Module 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

More on the Web

- Cisco Catalyst Switch Module 3110G/3110X info on PartnerWorld
- Cisco Catalyst Switch Module 3110G info on IBM.com
- Cisco Catalyst Switch Module 3110X info on IBM.com

- Fully compatible with Open Fabric Manager—enabled for I/O virtualization with no changes required in switch module during installation or after sever blade replacement or failover
- 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.

Cisco Gigabit Ethernet

The Cisco Intelligent Gigabit Ethernet Switch Module for the IBM BladeCenter provides BladeCenter customers with Cisco's Ethernet switching technology integrated within the BladeCenter chassis. This switch option further enhances BladeCenter's value proposition by seamlessly interfacing to customers' existing data networks using industry pervasive, SNMP-based management tools such as CiscoWorks.

More on the Web

- Cisco Gigabit Ethernet info on PartnerWorld
- Cisco Gigabit Ethernet info on IBM.com

Here are some quick Cisco Gigabit Ethernet Switch facts:

- Supports high-availability networks through support of advanced STP protocols and trunk failover functionality
- Optimizes delivery through support of multicast protocols such as IGMP snooping

- Eases network management through support of Cisco IOS, CiscoWorks, and Cluster Management System
- Ensures network security through support of RADIUS, TACACS+, 802.1x, and other authentication protocols.

Cisco Fiber Intelligent Gigabit Ethernet

The Cisco Systems Fiber Intelligent Gigabit Ethernet Switch Module option offers BladeCenter customers Cisco's world-class Ethernet switching technology integrated within the BladeCenter chassis. It further enhances BladeCenter's value proposition by easily interfacing with a customer's existing fiber-based data network using Cisco standard small form factor pluggable (SFP) modules.

More on the Web

- Cisco Fiber Gigabit Ethernet Switch info on PartnerWorld
- Cisco Fiber Gigabit Ethernet Switch info on IBM.com

Here are some quick Cisco Fiber Gigabit Ethernet Switch facts about the IGESM:

- External SFP-based ports for fiber connectivity (SFPs available from Cisco)
- Supports high availability networks through support of advanced STP protocols and trunk failover functionality
- Optimizes delivery through support of multicast protocols such as IGMP snooping
- Eases network management through support of Cisco IOS, CiscoWorks, and Cluster Management System

- Ensures network security through support of RADIUS, TACACS+, 802.1x, and other authentication protocols.

Nortel 10 Gb Ethernet

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

More on the Web

- Nortel 10 Gb Ethernet Switch info on PartnerWorld
- Nortel 10 Gb Ethernet Switch info on IBM.com

Here are some quick Nortel 10 Gb Ethernet Switch facts:

- Delivers high-bandwidth and time-sensitive switching for applications such as VoIP and IPTV with non-blocking 20-port 10 Gbps fabric for BladeCenter H
- Provides six external 10 Gb ports and 14 internal 10 Gb ports and a dedicated 1 Gb management port
- Simplifies deployment and helps reduce costs by integrating Layer 2-3 LAN switching and routing into a single BladeCenter chassis

- Maintain system uptime with high availability and resilience with L2 failover, Uplink Fast, Spanning Tree, Multiple and Rapid Spanning Tree, Router Redundancy Protocol (VRRP), and Equal Cost Multiple Routing (ECMP) for OSPF
- Standard-based VLANs for traffic segregation, advanced filtering, support for RADIUS, TACACS/TACACS+, and 802.1x for port security ensures end-to-end data integrity
- Flexible and simple management via Web browser or industry-standard CLI
- Offers dual 10 Gb Ethernet connections to each server blade when used in conjunction with the dual-port NetXen 10 Gb Expansion Card for IBM BladeCenter.

Nortel Layer 2/3 10 Gigabit Uplink Ethernet

IBM delivers the answer for bandwidth-hungry applications—the Nortel Layer 2/3 10 Gb Uplink Ethernet Switch Module (10 Gb ESM). This switch provides up to 45 Gbps non-blocking, line-speed bandwidth to meet your application requirements. With three 10 Gb uplink ports that can be trunked together—and 15 non-blocking Gigabit Ethernet ports—the 10 Gb ESM offers performance with room to spare for growing application needs.

More on the Web

- Nortel Layer 2/3 10 Gigabit Uplink Ethernet Switch info on PartnerWorld
- Nortel Layer 2/3 10 Gigabit Uplink Ethernet Switch info on IBM.com

Here are some quick Nortel Layer 2/3 10 Gigabit Uplink facts:

- Three 10 Gb uplinks at line-speed provide maximum bandwidth to any BladeCenter chassis
- Industry-standard ACLs, advanced traffic management, dynamic routing with RIP, OSPF, BGP, and VRRP, and unmatched network-wide quality of service for time-sensitive applications such as VOIP and IPTV
- High availability with L2 failover, Uplink Fast, Spanning Tree, Multiple and Rapid Spanning Tree, Router Redundancy Protocol (VRRP), and Equal Cost Multiple Routing (ECMP) for OSPF
- Standard-based VLANs for traffic segregation, advanced filtering, support for RADIUS, TACACS/TACACS+, and 802.1x for port security ensures end-to-end data integrity
- Flexible and simple management via Web browser or industry-standard CLI.

Nortel Layer 2/3 Copper Gigabit Ethernet

The Nortel Layer 2/3 Copper Gigabit Ethernet Switch Module offers new, integrated switch options enabling you to consolidate full Layer 2/3 LAN switching and routing capabilities into a single BladeCenter chassis. This consolidation helps flatten the data center infrastructure and reduces the number of discrete devices, management consoles, and equipment vendors that administrators need to deal with, helping to lower costs and simplify deployment.

More on the Web

- Nortel Layer 2/3 Copper Gigabit Ethernet Switch info on PartnerWorld
- Nortel Layer 2/3 Copper Gigabit Ethernet Switch info on IBM.com

Here are some quick Nortel Layer 2/3 Copper Gigabit Ethernet Switch facts:

- Offers six copper uplinks and strongest price/performance benefits
- Delivers complete Layer 2 and 3 functionality—routing, filtering, traffic queuing
- Better serves the processing demands of bandwidth-intensive applications
- Provides port flexibility and traffic management to improve maintenance
- Provides upgrade path to full Layer 4-7 services.

Nortel Layer 2/3 Fiber Gigabit Ethernet

The Nortel Layer 2/3 Fiber Gigabit Ethernet Switch Module enables you to consolidate full Layer 2/3 LAN switching and routing capabilities into a single BladeCenter chassis. This consolidation helps flatten the data center infrastructure and reduces the number of discrete devices, management consoles, and equipment vendors that administrators need to deal with, helping to lower costs and simplify deployment.

More on the Web

- Nortel Layer 2/3 Fiber Gigabit Ethernet Switch info on PartnerWorld
- Nortel Layer 2/3 Fiber Gigabit Ethernet Switch info on IBM.com

Here are some quick Nortel Layer 2/3 Fiber Gigabit Ethernet Switch facts:

- Offers six fiber uplinks (with SFPs) and strong price/performance benefits
- Delivers complete Layer 2 and 3 functionality—routing, filtering, traffic queuing
- Better serves the processing demands of bandwidth-intensive applications
- Provides port flexibility and traffic management to improve maintenance
- Provides upgrade path to full Layer 4-7 services.

Nortel Layer 2-7 Gigabit Ethernet

This option introduces Layer 2-7 forwarding decision capabilities and security features. Up to two Gigabit Ethernet modules can reside in the network slots of the BladeCenter chassis in addition to the current installation. They can be hot-plugged into BladeCenter without disrupting normal operations. The switch connects to the server blades via the 14 internal Gigabit Ethernet interfaces (server ports) over the BladeCenter midplane. It supplies four external Gigabit Eth-

More on the Web

- Nortel Layer 2-7 Gigabit Ethernet Switch info on PartnerWorld
- Nortel Layer 2-7 Gigabit Ethernet Switch info on IBM.com

ernet interfaces to the outside world. A console interface is available for diagnostics and direct communication between the Gigabit Ethernet Switch and the BladeCenter Management Module.

Here are some quick facts about the Nortel Layer 2-7 Gigabit Ethernet Switch:

- Increases application availability and performance
- Better serves the processing demands of bandwidth-intensive applications
- Greater infrastructure scalability
- Enhanced server security
- Delivers application and server load balancing.

Server Connectivity Module for IBM BladeCenter

As small and mid-size businesses try to squeeze more value from their IT systems and on-site networking skills, the Server Connectivity Module for IBM BladeCenter delivers a range of capabilities in scalable, flexible configurations. An intuitive graphical user interface (GUI) and integrated management software make this module affordable and simple for IT

More on the Web

- Server Connectivity Module for IBM BladeCenter info on PartnerWorld
- Server Connectivity Module for IBM BladeCenter info on IBM.com

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 medium-size 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 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.

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

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.

More on the Web

- Brocade SAN Switch info on PartnerWorld
- Brocade SAN Switch info on IBM.com

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.

QLogic 4 Gb Pass-Thru Fibre Channel

The QLogic 10-port and 20-port 4 Gb SAN Switch Modules are the latest Fibre Channel switching options for the IBM BladeCenter. These offerings allow BladeCenter integration with any open-standards-based storage area network (SAN), whether it is an enterprise open-system fabric functionality utilizing the full-fabric mode or the module with transparent switching functionality utilizing the Intelligent Pass-Thru mode. Managing the SAN Modules is also easy with the QLogic QuickTools. Additional management options include QLogic Enterprise Fabric Suite 2007, QLogic SAN Doctor, and QLogic Fabric Security. These QLogic software options offer extended SAN management features that enhance your management experience and reduce complexity as your SAN grows.

Secondly, IBM is offering a QLogic Intelligent Pass-Thru Module which 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 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.

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

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

- Easy-to-use 20-port module provides open, standards-based NPIV interface—simplifies SAN interoperability and scalability
- Affordable 4 Gb solution delivers an alternative to traditional optical pass-thru module providing link consolidation with up to six uplinks
- Upgradable via software keys allowing for full fabric switch functionality and direct attach to tape or disk storage.

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
- QLogic 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.

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 modules 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.

Here are some quick facts about this module:

More on the Web

- 4x InfiniBand Pass-Thru info on PartnerWorld
- 4x InfiniBand Pass-Thru info on IBM.com

- 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.
- 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.

Cisco Systems 4x InfiniBand

The Cisco Systems 4x InfiniBand Switch Module delivers high performance, low-latency server switching required to enable 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.

Here are some quick facts about this switch:

- Delivers high performance, low-latency server switching required to enable 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

- Cisco Systems 4x InfiniBand Switch info on PartnerWorld
- Cisco Systems 4x InfiniBand Switch info on IBM.com

- Provides 14 ports of 10-Gbps (4x) server connectivity to blades with less than 200 nanoseconds (ns) port to port latency and eight equivalent 4x 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
- Integrated with Cisco's latest release of Vframe—server fabric virtualization software—which offers rapid provisioning and real time re-hosting of server and network interfaces with policy-based utilization and high availability rules.

QLogic InfiniBand Ethernet Bridge

Leveraging the existing InfiniBand switches available for BladeCenter H, the QLogic InfiniBand Ethernet Bridge Module for IBM BladeCenter provides up to six 1 Gb Ethernet connections to the chassis. When interconnected, these bridge modules provide Ethernet interfaces to the chassis or rack of InfiniBand-connected blades. When configured as such, bridges can be shared across chassis and serve as gateways

to InfiniBand traffic for another chassis. This enables a completely self-contained cluster of InfiniBand-based BladeCenter blades and/or chassis to connect to the external network with little or no external switching.

More on the Web

- QLogic InfiniBand Ethernet Bridge Announcement Letter
- QLogic InfiniBand Ethernet Bridge info on PartnerWorld
- QLogic InfiniBand Ethernet Bridge info on IBM.com

Here are some quick QLogic InfiniBand Ethernet Bridge facts:

- Enables InfiniBand within the chassis while seamlessly connecting the chassis to the external Ethernet network
- Used in conjunction with the Cisco 4x InfiniBand Switch Module and provides up to six 1 Gb Ethernet connections to the external network
- Bridges enable consolidation of LAN and SAN connectivity for an entire data cluster to a single fabric
- Leverages powerful I/O capability of BladeCenter H without any reduction in switching capacity.

QLogic InfiniBand Fibre Bridge

Leveraging the existing InfiniBand switches available for BladeCenter H, the QLogic InfiniBand Fibre Channel Bridge Module for IBM BladeCenter provides up to six 4 Gb Fibre Channel connections to the chassis. When interconnected, these bridge modules provide Fibre Channel interfaces to the chas-

sis or rack of InfiniBand-connected blades. When configured as such, bridges can be shared across chassis and serve as gateways to InfiniBand traffic for another chassis. This enables a completely self-contained cluster of InfiniBand-based BladeCenter blades and/or chassis to connect to the external network with little or no external switching.

Here are some quick QLogic InfiniBand Fibre Bridge facts:

- Enables InfiniBand within the chassis while seamlessly connecting the chassis to the external Fibre Channel fabric
- Used in conjunction with the Cisco 4x InfiniBand Switch Module and provides up to six 4 Gb Fibre Channel connections to the external network
- Bridges enable consolidation of LAN and SAN connectivity for an entire data cluster to a single fabric
- Leverages powerful I/O capability of BladeCenter H without any reduction in switching capacity.

About the Editor

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 e-mail at jimh@maxpress.com.