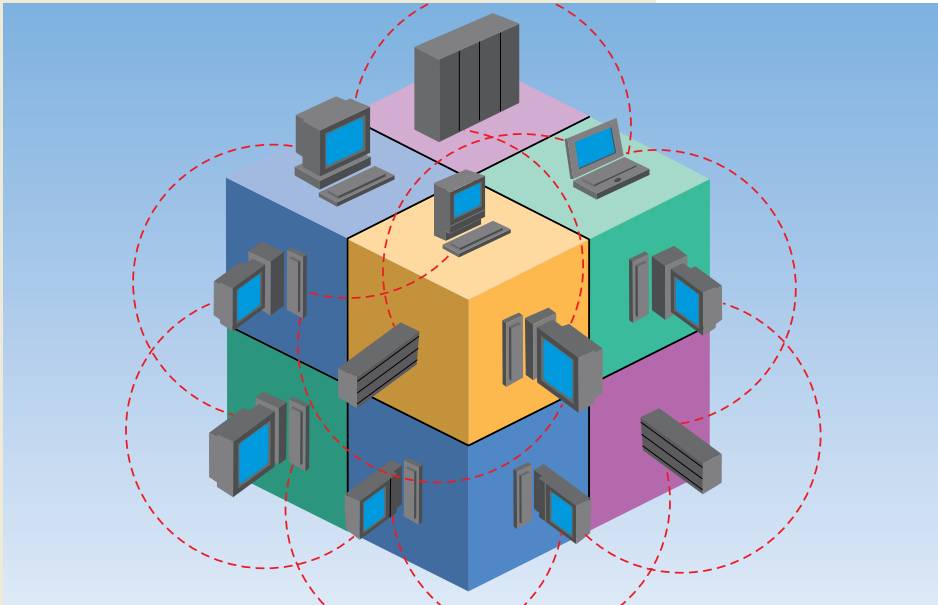# IBM System x and BladeCenter Business Partner Guidebook

Your Roadmap to Success with IBM System x, BladeCenter, and IntelliStation

Max Facts™
eBook

Edited by Jim Hoskins

IBM System x and BladeCenter Business Partner Guidebook

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IBM System x and BladeCenter Business Partner Guidebook

Fifth Edition

Your Roadmap to Success with IBM xSeries, BladeCenter, and IntelliStation

Edited by Jim Hoskins

(version 5.1e)

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Dear Colleagues:

IBM is deeply committed to providing you the support you need to meet your clients' current requirements and to help you constantly grow your skills and portfolio to address new and expanded opportunities.

As part of this partnership, it is important we make working with IBM as easy as possible, particularly facilitating your use of IBM tools and resources and helping you navigate the IBM infrastructure. I am pleased to provide the 1Q 2007 *IBM System x & BladeCenter Guidebook*—an interactive ebook with the resources, product quick references, and program details to help you sell the System x brand. We've also incorporated a new "9-Step Quick Start" to get you up to speed quickly so your selling can be productive immediately.

System x is an exciting place to be right now. IBM has the best, most innovative products on the market—from our X3 Architecture high performance systems, to our comprehensive and differentiated towers and racks, to our industry-leading IBM BladeCenter. On the sales end, our System Seller program helps you target IBM's Express product offerings at high growth opportunities in small and medium businesses (SMB). And the Express products are easy to sell, easy to install, and very competitively priced—with attractive rebates for you. I

encourage you to leverage these offerings and this program with your SMB customers.

For those of you who are existing IBM Business Partners, thank you for your business, your commitment, and for representing IBM so well. To new IBM partners or those considering a partnership, we welcome you, and we're pleased you are joining us to deliver IBM's excellent products and services to our mutual customers. Regardless of whether you are a new or an existing partner, I expect you will find this guide informative and helpful in growing our partnership and in building your own business success.

Please let me know how IBM can continue to help you succeed.

Regards,

John Teltsch
Vice President, Worldwide Sales, System x
IBM Systems and Technology Group
Somers, NY

Your 9-Step Quick Start

Take these 9 steps to "hit the ground running" as a new IBM Business Partner.

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> • Get your PartnerWorld user ID
> • Explore PartnerWorld
> • PartnerWorld contact phone numbers by country

guidelines, support, product info, etc.). You 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-sized business environment. Most System x, some BladeCenter, and all IntelliStation products are now only offered as Express models, which offer more aggressive pricing 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

IBM Express Seller is a marketing program that enables Business Partners to more efficiently sell the IBM Express portfolio of offerings (described in step 3). It offers extensive marketing support including "air cover" advertising and customizable materials to help you generate leads. Learn how to leverage this program and you will be on the way to increased profits.

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

MORE ON THE WEB

- Find detailed IBM product information quickly

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.

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 even earn points by completing these modules which can be redeemed for sales incentives that reward sales performance.

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 *moreinfo@maxpress.com*.

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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.

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1

Welcome to the Team

In this chapter, we cover the basics of working with IBM.

Why Team with IBM?

IBM has been laser-focused on a strategy first introduced in October 2002 under the name "e-business on demand" and now called "On Demand Business." At its core, the On Demand Business model refers to the ability of a business to effectively respond to change. In the words of IBM Chairman and CEO Sam Palmisano, an on demand enterprise is one "whose business processes—integrated end-to-end across the company and with key partners, suppliers, and customers—can respond with flexibility and speed to any customer demand, market opportunity, or external threat."

The era of On Demand Business is just beginning, and there has never been a better time to team with IBM. The On Demand Business model plays directly to the strengths of IBM—namely, comprehensive end-to-end business solutions. IBM has the broadest portfolio of integrated business solutions in the industry. As an IBM Business Partner, you can maximize your revenue by providing your customers with a complete, integrated solution stack. Your business will grow, and your customers will thrive as you lead them into the on demand world.

Together, IBM and IBM Business Partners are already helping businesses of all sizes move toward the On Demand Business model. IBM is fully committed to the IBM Business Partner channel because it works. The portion of total IBM revenue attributed to IBM Business Partners was about 10 percent in the 1980s. Now it is approximately one-third. IBM Business Partners are the foundation of the On Demand Business go-to-market strategy for small and medium-sized businesses. To document its commitment to Business Partners and ensure a consistent partner relationship, IBM has developed a set of guidelines called the IBM Business Partner Charter (first published in 1996) and has made it available to every Business Partner for review.

Consider these facts about IBM:

- One of the world's top ten 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 leadership your customers need to become fully integrated on demand businesses.

MORE ON THE WEB

- About IBM's patent portfolio

Why the Move from "xSeries" to "System x?"

On April 21, 2006, IBM announced the IBM System x product line which is an evolution of the IBM eServer xSeries family. The name change from xSeries to System x brings IBM's x86 server family fully under the IBM Systems Agenda alongside the other "IBM System" product lines (IBM System p5, IBM System z9, etc.). The IBM Systems Agenda is a strategy statement that communicates IBM's approach to the design, marketing, and support of IBM servers and storage product families. That is, the Systems Agenda is an articulation of the strategy for linking the On Demand Business model to the underlying technology through three basic principals: collaborative innovation, openness, and virtualization.

The IBM System x name will be rolled out over time so products will be sold under both xSeries and System x until the products with the old name are replaced. The System x naming structure defines a meaning for 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, 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.

IBM Systems Agenda

A company's profit and growth are driven by its ability to innovate and grow—and to respond on demand to market conditions quickly, decisively and dynamically. Using IT to make relevant, timely information available to employees, partners and clients helps drive that responsiveness and position a company to find new ways to innovate that uniquely matter to them. IT systems can become accelerators of that innovation by:

- Providing information on demand

- Helping to increase productivity

- Enabling new thinking across the company and the business value chain.

Companies can derive additional value by streamlining processes and better using technology to manage costs and enable new business capabilities. The Systems Agenda for On Demand Business demonstrates IBM's commitment for delivering innovative technology and expertise to help you achieve business advantage. It provides a strategic commitment to help deliver systems around key imperatives that can help you find innovative solutions through collaboration, integrate open industry standards into your data center, and virtualize your IT resources.

> **MORE ON THE WEB**
>
> - IBM Systems Agenda

Virtualization

The move to increased virtualization throughout your data center—including local server resources and remote storage—

can offer an improved approach to systems design, development and delivery. This, in turn, can dramatically enhance your ability to improve utilization.

Openness

IBM promotes building based on open and industry standards. This allows sharing in such a way that systems—IBM and non-IBM—can integrate better and more easily.

Collaboration

Working with you and industry partners to implement IT solutions that can drive innovation and help transform businesses is IBM's goal.

Extending our sustained systems leadership, IBM System x servers bring innovative technology based on decades of business insight and a broad portfolio of tested business solutions to the industry-standard market.

These pay-as-you-grow solutions are designed to deliver exceptional availability, simplified manageability, outstanding performance and revolutionary scalability to help you build a cost-effective, flexible IT environment.

System x servers were designed to support the Systems Agenda—systems that are open, that can easily interoperate with others and yet are secure and available when needed; systems that help you simplify and optimize your IT.

The goal is to improve your access to information so that you can make better business decisions and stay competitive.

Why IBM System x?

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 and the IBM PowerExecutive covered later in this chapter.

MORE ON THE WEB
• System x awards and reviews
• More System x reviews

Till then here are just a couple examples of the many accolades System x has earned from the industry:

> *"IBM's x3105 offers a serious, sober server at desktop prices. Rather than plow your investment into flashy toys, the x3105 offers server-grade features and management support that's hard to find at its price level. This server makes a lot of sense for small businesses in need of a light-duty server, particularly for file and Web serving, content management or point-of-sale transactions. Its small size and quiet operation let you keep it where bigger iron doesn't fit—right under your desk."*

–smallbusinesscomputing.com

> *"The x3655 edges out similarly equipped competitors in the price department and offers as standard features a HyperTransport riser and SAS RAID adapter. Built on Advanced Micro Devices' latest Rev F Opterons, the IBM System x3655 server is an efficient*

general-purpose workhorse with ample room for memory expansion."

–eWeek Magazine

Why IBM BladeCenter?

There are many reasons why IBM BladeCenter has become so popular. During the development of IBM BladeCenter, IBM worked closely with clients to ensure that IBM BladeCenter's innovative modular technology and leadership density and availability were designed to help solve a multitude of real-world problems. For organizations seeking server consolidation, IBM BladeCenter centralizes servers for increased flexibility, ease of maintenance, reduced cost and streamlined human resources. Companies that need to deploy new ecommerce and ebusiness applications can achieve speed while ensuring flexibility, scalability and availability.

For enterprise requirements like file-and-print and collaboration, IBM BladeCenter is designed to offer reliability, flexibility for growth and cost effectiveness. And clients with compute-intensive applications that need highly available clustering can use IBM BladeCenter to help achieve high degrees of scalability and performance.

> **MORE ON THE WEB**
>
> • Videos: Customers using BladeCenter

Power and Cooling

Power and cooling are becoming increasingly important as performance demands increase and energy costs continue to

rise. IBM is pioneering new technologies that allow our blades to often generate less heat output and use less energy to cool the system than the competition in common configurations. Simply put, the IBM BladeCenter "runs cooler" to deliver greater reliability and potentially significant cost savings in a high-density environment. Here are just a few of the reasons why.

Calibrated Vectored Cooling—An IBM innovation, Calibrated Vectored Cooling optimizes the path of cooled air flow through the system, directing cool air to the areas that need it, and blocking hot air from entering critical areas of the system. This allows our systems to run cooler and use less power.

Power Executive—An IBM innovation, the Power Executive is the intuitive brain behind the efficiency of the IBM BladeCenter cooling approach. The Power Executive senses and responds real-time to changes in the environment, calibrating cooling and system processing to optimize power usage. For example, the Power Executive can speed up or slow down blowers and fans as needed, reducing power consumption and saving costs up to 6x over the competition.

Cool Blue—Available across our range of systems, Cool Blue is a water-cooled door that is placed on the back of racks in the server room, cooling the air that the system puts out. This IBM innovation can save customers substantially in energy costs by reducing air conditioning needs. Plus, as your cooling re-

MORE ON THE WEB

- Cool Blue energy management
- PowerExecutive

quirements decrease, you can fit more high-density servers into smaller spaces, reducing the need for additional server real estate.

Intelligent I/O

IBM Virtual Fabric Architecture enables flexible and open interconnect technologies and management tools to help increase speed and efficiency of data transfer across blade servers and networks. This means that data-intensive technologies, such as Web 2.0, IPTV and online gaming pose no problem for BladeCenter. Clients can even run more applications from a single blade server with the increased broadband enabled by the high-speed network connections. Intelligent I/O provides:

MORE ON THE WEB
• IBM Virtual Fabric Architecture

- Fast and efficient data transfer with tenfold network speed

- Double the possible Fibre Channel or Gb Ethernet connections to each blade

- End-to-end security and high availability

- Reliable connectivity

- Flexibility.

Whether you are building a central office or growing your datacenter, IBM BladeCenter provides comprehensive leadership and innovative solutions.

Flexibility and Choice

IBM knew all along that in order to make the IBM BladeCenter the most flexible and powerful infrastructure, they would need the help of many innovative companies... so that's why BladeCenter is an open system. And that's why early on, IBM published the technical information necessary for other companies to develop blades, network switches, and other innovative devices for IBM BladeCenter to further drive technology advances that help solve real business problems and give customers more choice. As a result, over 700 other companies with names like Nortel, McData, CipherOptics, Cisco, Emulex, Motorola, Nominum, QLogic, SanRad, and Brocade are now shipping products that help make Blade-Center all that it can be. And the open Blade.org group launched in 2006 will enable more innovation for IBM BladeCenter customers. Collectively, the hardware, software, and services offered by IBM and its over 700 participating companies make up a vast "ecosystem" that offers incredible flexibility for addressing wide-ranging business needs.

More on the Web
• Blade Open Specification
• Blade.org

System Investment

By getting the design right in the first place, IBM BladeCenter created a culture of compatibility that results in these important factors:

Investment protection—You can reuse key hardware components while you incorporate emerging technology into your infrastructure over time in an evolutionary way.

Cost savings—With IBM BladeCenter's focus on compatibility, you avoid the need to remove, retest, recertify, and reinstall a new hardware infrastructure—saving hard dollar costs and avoiding the down time and wasted staff time.

Choices—Compatibility over time has been crucial to preserving the richness of the BladeCenter ecosystem and the flexibility that results.

X-Architecture

The X-Architecture blueprint takes a comprehensive approach—using innovative hardware, software, and services—to solving customer challenges today, and embraces an evolving design approach to addressing tomorrow's challenges. Although the fundamental premise of X-Architecture technology will not change over time, the underlying technologies and how they are delivered will constantly mature to meet the needs of our customers. IBM takes the best of industry-standard technologies (even helping to shape some of

MORE ON THE WEB

- X-Architecture info on PartnerWorld

them through participation in standards groups) and combines them with IBM innovations to provide the greatest possible flexibility in System x and BladeCenter servers.

Proactive Management

Inexpensive servers aren't so inexpensive if they require excessive administrative or servicing time to bring them online and keep them that way. Hardware and software tools that simplify deployment, monitor system health, limit power usage, and report pending problems are crucial to keeping costs under control. IBM offers a number of tools to help you tame the complexity of systems management and administration while managing costs, including IBM Director software, IBM Remote Deployment Manager (RDM), IBM UpdateXpress, IBM Virtualization Manager, IBM PowerExecutive, IBM Dynamic System Analysis (DSA), Predictive Failure Analysis (PFA), Baseboard Management Controller (BMC), and IBM Remote Supervisor Adapter II SlimLine, to name a few.

Adaptive Performance

As always, performance is a major concern for most customers. However, the emphasis now has shifted from processor clock speed to the number of processor cores, the amount and speed of memory, and even the design of the memory bus and processor cache. For example, to get double the performance of a single-core processor, a dual-core processor requires double the memory. More than that, however, it requires equally fast memory.

For a truly flexible and adaptable data center, you need the ability to increase performance on demand, with a minimum of fuss and cost. System X delivers this flexibility. For example, consider the x3950 server with XpandOnDemand capability. It's a 4U Intel Xeon-based 1-to-4-processor rack server, with

support for up to 64 GB of DRAM and four HDDs. If you ever find the need for more processors and memory, simply attach a 4U x3950 MXE chassis to the x3950 via the supplied cable. It immediately doubles your processor and memory capacity. Still not enough? Add up to six more x3950 MXE chassis to the x3950, for a whopping total of 32 processors (in 32U), 512 GB of RAM, and 32 HDDs. If your needs run to blade servers, consider the AMD Opteron LS41 for IBM BladeCenter server. It's a standard single-wide (30mm) 1-2 processor blade server that supports up to 16 GB of PC2-5300 or 32 GB of PC24200 DRAM and two internal HDDs. Should you need more processing power, a second blade (an optional 30mm Multiprocessor Expansion Unit) can be snapped onto the first blade in the adjacent blade slot, doubling the processor and memory capacity of the now double-wide blade.

Modular Optimization

High performance is only useful when a server is up and running. Consequently, reliability, availability and serviceability are more important than ever. To this end, IBM incorporates a number of innovations as standard equipment in its System x and BladeCenter servers such as light path diagnostics, hot-swap/redundant components, and IBM Xtended I/O.

Integrated Infrastructure

Inexpensive "scale-out" servers offer great flexibility in deployment. However, their very existence creates complexity. All those 1U and 2U servers have to be housed in racks and inter-

linked with a web of KVM cables, KVM switches, network cables, network switches, power distribution units, and more. Managing this complexity takes time and costs money. As a result, anything you can do to simplify the process can help save you money. One approach is to replace many individual 1U/2U rack servers with a few chassis containing blade servers; another is to simplify the cabling and other infrastructure components used with your rack servers. And, of course, you can use both approaches as appropriate. The beauty of the Blade-Center architecture is that now everything needed for the solution can be housed and managed from a single point of control.

Power Management

Managing power and cooling resources has become a critical issue in the data center as power consumption and thermal loads increase. Successfully meeting these power and cooling challenges requires well-thought-out IT products, smart data center design and a method for efficiently controlling and monitoring your systems' power and heat requirements.

Cool Blue

The IBM Cool Blue portfolio of tools demonstrates leadership thinking and sets the industry direction for optimal thermal efficiency. This efficiency is delivered through a number of technologies common to both System x and BladeCenter to help improve your server and data center power management including low-voltage processors, 2.5-inch HDDs, IBM Rear Door Heat eXchanger, calibrated vectored cooling, and energy-efficient power supplies.

PowerExecutive

In order to put control of processor power-saving features at the fingertips of administrators, IBM developed IBM PowerExecutive. PowerExecutive is a powerful software tool designed to take advantage of new processor features, such as balancing the performance of the system according to available power input.

PowerExecutive, a plug-in for IBM Director, provides the ability to plan, predict, monitor and cap power consumption based on your System x or BladeCenter hardware configuration. It also allows you to reduce the infrastructure required for redundancy, by using fewer servers with smaller power feeds and potentially lowering your overall

> **MORE ON THE WEB**
>
> - PowerExecutive info and demo on IBM.com
> - Cool Blue info on IBM.com

data center support costs. It does this, for example, by inventorying all components at the blade level, then adding up the power draw for each blade and tracking that usage. In failure mode, IBM PowerExecutive (via the BladeCenter Management Module or Advanced Management Module, for example) might request that certain blades in each domain throttle down to reduce power consumption.

What Are "IBM Express" Offerings?

While the needs of small and mid-sized businesses (SMB) often are conceptually similar to the needs of larger enterprises, the scale typically is smaller. For this reason, IBM de-

veloped 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-sized customers and the IBM Business Partners that help service them. Express offerings retain the functions and features sought most by mid-sized 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 has moved most System x, many BladeCenter, and all IntelliStation products under the IBM Express umbrella (e.g. in the U.S, all uni- and dual-socket systems with AMD and Intel processors are Express models). 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.

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• PartnerWorld membership levels
• Help with your IBM PartnerWorld user ID and password

In this ebook, we have summarized and provided direct links to a great deal of PartnerWorld information of interest 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.

Here are a couple of quick tips to getting the most out of the IBM PartnerWorld Web site:

• 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).

• There is a great deal of information of use to System x Business Partners behind the "System Sales" link on the PartnerWorld home page. Click on that link (enter your user ID and password) and then you can use the filtering function shown at the top of the page. For example, you can use the pull-down menus to set "Geography" to your country and "product" to "System x" to reduce the amount of information you need to review when looking for what you need.

- Once you are on the System Sales page, you can see all of the resources related to a specific product line by typing the product name in the "System Sales Search" box located on the right side of the page (NOT the general search box at the top of the page). Make sure you have selected the right product area before you click the search button.

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

> **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

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

MORE ON THE WEB

- Know Your IBM training modules

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 vali-date 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, IBM maintains a database of existing customer success stories, complete with company profiles, identified needs, solutions, and resulting benefits. IBM Business Partners can use these success stories with customers to advance the sell cycle. To see what is available, simply follow the links provided in the "More on the Web" box.

MORE ON THE WEB

- System x and BladeCenter success stories

Sources for Competitive Marketing Information

IBM maintains a Web site called "Comp," which is a world-wide 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

You can also sometimes find some "product-to-product comparison" information by using the keyword search function provided within the System Sales pages of the PartnerWorld Web site, but this should be considered a secondary source of competitive information.

ePlaybook for System x and BladeCenter

You'll find all you need to get started in our ePlaybook on System Sales on the PartnerWorld Web site. Here you will find

links to download presentations, on-demand webcasts, and other resources to help you unleash the power of our unique technologies. You will find everything you need to know about the latest System x and BladeCenter sales plays and initiatives—with a special focus on the SMB market.

There are chapters that cover the big plays so you can learn more about what's driving revenue growth right now. Use the decision matrices to Choose the Right Tactic that can address your client's pain-points. Download the "reasons of call," proposal letters, presentations, benchmarks and sales tools to help you identify, progress and close deals. Find tips for increasing deal size with services (new this quarter), options and storage, and including relevant financing highlighted to improve your odds of winning the sale.

MORE ON THE WEB
• ePlaybook for System x & BladeCenter

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

Adding 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

Adding 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 new IBM System Storage DS3000 series product family replaces the IBM TotalStorage DS300 and DS400 disk systems. This new 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 afford-

able 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 with the DS3200 and DS3400 models.

The IBM System Storage DS4000 series mid-range storage systems offers affordability, flexibility and high-performance. The DS4000 models are designed to deliver high-bandwidth performance to both Windows and UNIX environments. The DS4800, DS4700 and DS4200 all offer a 4 Gb Fibre Channel interface, the fastest available in the industry today. 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:

MORE ON THE WEB

- Free ebook: *IBM System Storage Business Partner Guidebook*
- Storage products for System x and BladeCenter servers on IBM.com

- 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-sized business environment (see "What Are 'IBM Express' Offerings?" in Chapter 1).

DS3000

The IBM System Storage DS3000 family replaces the DS300 and DS400 disk systems.

DS3200

Small businesses can take an overburdened internal storage infrastructure to a new level by using the flexible and affordable IBM System Storage DS3200 storage system (Figure D.1). By moving storage outside the server, small businesses can increase the capacity and reliability of the data solution well beyond the initial storage investment. The DS3000 Storage Manager software was designed for easy implementation for an unseasoned administrator.

The DS3200 capacity is increased by either adding hard disk drives or by expanding the configuration and adding

Specifications

Models	1726-21X—single controller
	1726-22X—dual controller
RAID controller	Dual active
Cache	512 MB battery-backed
Host interface	1 or 3 host ports per controller, Serial Attached SCSI (SAS) 3 Gbps
Drive interface	Serial Attached SCSI (SAS)
Supported drives	Supports 3 Gbps SAS drives at 10,000 rpm and 15,000 rpm speeds
RAID levels	RAID-0, -1, -3, -5, -10
Storage partitions	4, 16
Maximum drives supported	48 SAS drives (using three EXP3000 Expansion Units)
Fans and power supplies	Dual-redundant, hot-swappable
Rack support	19" industry-standard rack
Management software	IBM System Storage DS3000 Storage Manager
Warranty	3-year parts and labor

- DS3200 details on PartnerWorld

- DS3200 details on IBM.com

- DS3200 competitive info on COMP

Figure D.1. IBM TotalStorage DS3200 storage subsystem at a glance (and links to more detail).

EXP3000 expansion units. Both these operations can be done without having to shut down the DS3200.

The DS3200 is a comprehensive storage solution for IBM System x and select third-party servers. This flexibility allows you to break free of server barriers and use a single storage solution in a mixed vendor environment.

Here are some quick DS3200 facts:

- 3 Gbps Serial Attached SCSI (SAS) interface technology

- Scalable to 3.6 TB of storage capacity with 300 GB hot-swappable SAS disks

- Expandable by attaching up to three EXP3000s, a total of 14.4 TB of storage capacity.

DS3400

The DS3400 (Figure D.2) offers the opportunity to meet the demands of data expansion, data availability and flexibility in a simple, affordable disk system. The DS3400 can be easily installed without extensive knowledge or effort. The DS3000 Storage Manager software was designed for simple implementation by an unseasoned administrator.

The DS3400 capacity is increased by adding hard disk drives or by expanding the configuration and adding EXP3000 expansion units. Both of these operations can be done without shutting down the DS3400. This means "zero-impact" to your environment and gives the users control of data storage as they expand capacity on an as-needed basis.

The DS3400 is a comprehensive storage solution for IBM System x, BladeCenter and select third party servers. This

Specifications

Models	1726-41X—single controller
	1726-42X—dual controller
RAID controller	Dual active
Cache	512 MB battery-backed
Host interface	2 host ports per controller, Fibre Channel (FC) 4 Gbps auto-sensing 1 Gbps/2 Gbps
Drive interface	Serial Attached SCSI (SAS)
Supported drives	Supports 3 Gbps SAS drives at 10,000 rpm and 15,000 rpm speeds
RAID levels	RAID-0, -1, -3, -5, -10
Storage partitions	2, 4, 16
Maximum drives supported	48 SAS drives (using three EXP3000 Expansion Units)
Fans and power supplies	Dual-redundant, hot-swappable
Rack support	19" industry-standard rack
Management software	IBM System Storage DS3000 Storage Manager
SAN support	Supported IBM FC switches
Warranty	3-year parts and labor warranty

- DS3400 details on PartnerWorld
- DS3400 details on IBM.com
- DS3400 competitive info on COMP

Figure D.2. IBM TotalStorage DS3400 storage subsystem at a glance (and links to more detail).

flexibility allows you to break-free of server barriers and use a single storage solution in a mixed vendor environment.

Here are some quick DS3400 facts:

- 4 Gbps Fibre Channel interface technology

- Easy to deploy and manage with the DS3000 Storage Manager

- Scalable to 3.6 TB of storage capacity with 300 GB hot-swappable SAS disks

- Expandable by attaching up to three EXP3000s, a total of 14.4 TB of storage capacity

- Flexible for use with IBM System x and BladeCenter servers

- Affordable for the small and medium business budgets.

DS4000

The IBM System Storage DS4000 series (formerly known as the FAStT family) is a family of midrange rack-mountable storage devices that can be used in multiple operating environments (Microsoft Windows, Netware, Linux, and UNIX). They include the DS4200 Express, DS4700 Express, and DS4800.

DS4200 Express

The IBM System Storage DS4200 Express Model 7V disk storage system is a SATA-only disk storage solution designed to be an economical alternative for data archiving, reference data, and near-line storage applications.

Here are some quick DS4200 facts:

- 4 Gbps Fibre Channel inter-face technology

- Up to 1600 MBps bandwidth for high throughput applications

- SATA only hard disk drives supported

- Includes IBM System Storage DS4000 Storage Manager to help centrally manage the DS4000 series

- Four total host channels with dual controllers.

DS4700 Express

The IBM System Storage DS4700 Express offers high-performance 4 Gbps capable Fibre Channel connections, up to 33.6 TB of Fibre Channel physical storage capacity, 56 TB of SATA physical storage capacity, and powerful system management, data management and data protection services.

Here are some quick DS4700 facts:

- End-to-end 4 Gbps capable Fibre Channel interface technology to help optimize performance

- Up to 1600 MBps bandwidth for higher throughput applications

- Support for Fibre Channel hard disk drives

- Includes IBM System Storage DS4000 Storage Manager to help centrally manage the DS4000 series

- Eight total host connections with dual controllers for increased connectivity

- Support for up to 112 disk drive modules with the attachment of six DA4000 EXP810 Expansion Units.

DS4800

IBM System Storage DS4800 disk storage system supports a high-performance 4 Gbps Fibre Channel interface for increased host connectivity to deliver necessary bandwidth for high throughput applications.

Here are some quick DS4800 facts:

> **MORE ON THE WEB**
>
> - DS4800 details on PartnerWorld
> - DS4800 details on IBM.com

- 4 Gbps Fibre Channel interface technology

- Up to 1600 MBps bandwidth for high throughput applications

- Fibre Channel and SATA hard disk drives supported

- Includes IBM System Storage DS4000 Storage Manager to help centrally manage the DS4000 series

- Eight host channels with dual controllers for increased connectivity.

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 most common attach elements is suggested. The tool also pro-vides 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.

MORE ON THE WEB

- Attach Connector cross selling tool

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 solu-tions. 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 Blade-Center Solution for Bioinformatice

MORE ON THE WEB

- System x turn-key solutions

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 environment. 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.

Tivoli Express Products for System x

Tivoli's new Express products focus on ease-of-use, simple installation and quick time-to-value to provide you with a broader solutions portfolio, faster sales cycles and in-creased software and service opportunities to capture mar-

> **MORE ON THE WEB**
>
> • Tivoli Express info on IBM.com

ket share in the fast-growing mid-market. They address these four primary needs of mid-market customers:

- Automated backup and recovery

- Availability management

- Identity management

- Software patch distribution and inventory management.

Here are some examples of Tivoli Express software offerings:

IBM Tivoli Continuous Data Protection for Files—a unique blend of replication, continuous protection/versioning, and tra-

ditional scheduled backup, all in one very simple-to-use package suitable for a broad range of deployment opportunities.

IBM Tivoli Storage Manager Express—ideal for customers who want a basic backup and recovery solution that is inexpensive, and easy to deploy and use.

IBM Tivoli Identity Manager Express—an identity management solution designed for the SMB market. It's easy to install, easy to deploy, and easy to manage.

IBM Tivoli Composite Application Manager—helps you increase the performance and availability of business-critical applications, including portal and SOA-based technologies.

IBM Tivoli Monitoring Express—a powerful, affordable and easy-to-use availability management solution designed to help small to mid-sized companies manage IT infrastructures.

IBM Tivoli Provisioning Manager Express—helps small or mid-sized organizations efficiently and cost-effectively automate inventory and software distribution management.

Visit Tivoli Express Central (see the "More on the Web" box) to find all the resources available for Tivoli Express products organized by category—including videos, collateral, playbooks, education, technical resources and more.

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

MORE ON THE WEB
• HPC clusters sales kit
• Departmental & workgroup HPC clusters resource kit

are used as "compute nodes" to build IBM clusters, especially the dual-socket systems (rack-optimized or blade) along with industry-leading, third-party/OEM components.

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 now working with Microsoft's new Windows Compute Clusters Server 2003, a new 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 online via the Web and by voice. Voice support can

be accessed via PartnerWorld Contact Services, the single point of entry to all key support organizations. PartnerWorld Contact Services provides access to Techline for hardware and software 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:

- 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 suc-ceed. System x serv-ers are divided into three groups: tower servers, rack-opti-

mized servers, and high performance scalable 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.

x100

The IBM eServer xSeries 100 Express Models (Figure T.1) combine entry-level affordability with server-class features to

Specifications

Form factor/height	Tower
Processor (L2 cache/CPU GHz/ front-side bus MHz max)	Intel Pentium D (2x2 MB/up to 3.0/800), Intel Pentium 4 (1 MB or 2 MB/up to 3.4/800), or Intel Celeron (256 KB/ up to 2.66/533), all support Intel Extended Memory 64 Technology
Number of processors (std/max)	1/1
Memory (std/max)	256 MB or 512 MB/8 GB PC2-4200 DDR II via 4 DIMM slots
Expansion slots	2 PCI, 2 PCI-Express
Disk bays (total)	2 fixed Serial ATA (SATA)
Maximum internal storage (std/max)	80 GB or 160 GB/1 TB SATA
Network interface	Integrated Gigabit Ethernet
Power supply (std/max)	310W 1/1
RAID support	Optional
Systems management	IBM ServerGuide
Operating systems supported	Windows Small Business Server 2003, Microsoft Windows Server 2003 Standard Edition/Enterprise Edition, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Novell NetWare
Limited warranty	1-year onsite limited warranty

- x100 details on PartnerWorld

- x100 details on IBM.com

- x100 competitive info on COMP

Figure T.1. xSeries 100 Express Models at a glance (and links to more detail).

address the needs of small businesses. With the x100, you can rely on a proven server that is easy to implement and deploy. With powerful functionality designed to last, the x100 is designed to support your business as it grows.

Protect your investment with an easy-to-implement, complete server solution. IBM service and support provides peace of mind for small businesses without a large IT staff.

Here are some quick x100 facts:

- Reliable, pretested server backed by IBM service and support

- Easy-to-use server for deployment out-of-the-box and simplified management

- Entry-level, fixed-function server provides powerful functionality.

x206m

The IBM eServer x206m (Figure T.2) features easy management, deployment, and service, providing outstanding performance and high availability at an entry-level price. The x206m is highly expandable and provides unprecedented system availability. On select models, upgrade hard disk drives (HDDs) from low-cost, fixed Serial ATA (SATA) to Serial Attached SCSI (SAS), a new HDD technology that adds more performance and features. And even if an HDD or power supply fails, the x206m can stay up and running with features such as hot-swap SATA and SAS HDDs and redundant power supplies.

Specifications

Form factor/height	Tower/5U
Processor (L2 cache/CPU GHz/ front-side bus MHz max)	Intel Pentium D (dual-core) (2 x 2 MB/up to 3.2/800) or Intel Pentium 4 (1 MB or 2 MB/up to 3.4/ 800), both support EM64 T
Number of processors (std/max)	1/1
Memory (max)	Up to 8 GB PC2-4200 DDR II
Expansion slots	2 PCI, 2 PCI-X (model dependent) and 2 PCI-Express
Disk bays total/hot-swap	4 fixed simple swap or hot-swap Serial ATA disk drives or 4 hot-swap Serial Attached SCSI disk drives
Maximum internal storage	Up to 1.2 TB hot-swap Serial Attached SCSI HDDs, or up to 1 TB hot-swap, simple-swap or fixed Serial ATA HDDs
Network interface integrated	10/100/1,000 Ethernet
Power supply (std/max)	400W 1/1 or 430W hot-swap redundant 2/2
Hot-swap components	Hard disk drives, power supplies (model dependent)
RAID support integrated	IBM ServeRAID-8e (RAID-0, RAID-1), optional upgrade to RAID-5 and RAID-6
Systems management	IPMI 1.5-compliant mini-BMC, IBM Director, Alert Standard Format 2.0, ServerGuide, optional Remote Supervisor Adapter II and optional Remote Deployment Manager
Operating systems supported	Microsoft Windows, Red Hat, Linux, SUSE Linux, Novell NetWare, OS 4690
Limited warranty	1-year or 3-year onsite limited warranty

- x206m details on PartnerWorld
- x206m details on IBM.com
- x206m competitive info on COMP

Figure T.2. IBM eServer xSeries 206m at a glance (and links to more detail).

New features such as DDR II memory and PCI Express help extend the life of your system. Dual-core processor models provide higher performance for systems running multiple applications. Protect your data with IBM ServeRAID8e, which provides RAID 0 or 1 with features beyond those of standard server operating systems.

Here are some quick x206m facts:

- Manage your business with a server that offers many con-figurations and room to grow

- New technologies such as dual-core processors help protect your investment

- New, high availability features help keep systems running.

x3105

The x3105 (Figure T.3) is an ideal server for small businesses purchasing a first server for file and print or small business applications. In addition, add tape backup, UPSs and other options to the x3105 to protect business-critical data as your needs arise. IBM ServerGuide helps you install the operating system, getting you up and running quickly. The x3105 can also be ordered with Microsoft Windows Small Business Server 2003 preinstalled. Along with its affordable price, the x3105 includes the latest server technologies your business needs to stay competitive, such as dual-core processors and ECC memory—providing a dependable small business server solution.

Here are some quick x3105 facts:

Specifications

Form factor/height	Tower
Processor (max)	AMD Opteron 1000 series (dual-core) or AMD Athlon 3500+ (single-core)
Number of processors (std/max)	1/1
Cache (std/max)	2x1 MB or 512 KB (model dependent)
Memory (std/max)	512 MB or 1 GB/8 GB DDR II 667 MHz via 4 DIMM slots
Expansion slots	2 PCI, 2 PCI-Express (x8, x8)
Disk bays	2 Serial ATA (SATA) or nearline SATA
Maximum internal storage	1 TB SATA
Other disk bays	One 5.25" bay for CD-RW/DVD combo or CD-ROM standard One 5.25" bay for additional optical or tape drive optional One 3.5" bay for diskette drive optional
Network interface	Integrated Gigabit Ethernet
Power supply (std/max)	310W 1/1
RAID support	OS RAID-0, -1; hardware-based RAID-0, -1 optional
Ports	Front: two USB Rear: four USB, one Ethernet, one serial, one parallel
Systems management	IBM ServerGuide
Operating systems supported	Windows Small Business Server 2003, Microsoft Windows Server 2003 Standard Edition/Enterprise Edition, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Novell Netware
Limited warranty	1-year onsite limited warranty

- x3105 details on PartnerWorld

- x3105 details on IBM.com

- x3105 competitive info on COMP

Figure T.3. IBM System x3105 at a glance (and links to more detail).

- Built to last, protecting your investment as your business grows

- Easy to use so you can spend your time managing your business

- Affordable, yet includes the latest server technology.

x3200

With unprecedented system availability, the x3200 (Figure T.4) 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-sized businesses or distributed large enterprises

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 HDDs
Maximum internal storage	Up to 1.2 TB Serial Attached SCSI (SAS) HDDs or up to 3.0 TB Serial ATA 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 (model dependent) Optional upgrade to RAID-5 and RAID-6
Ports	Front: Two USB, Rear: Four USB; one Ethernet; two serial; one parallel; keyboard and mouse
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, Linux, Novell NetWare, IBM OS 4690

- x3200 details on PartnerWorld

- x3200 details on IBM.com

- x3200 competitive info on COMP

Figure T.4   IBM System x3200 at a glance (and links to more detail).

- More availability and management features than other systems in its class

- Quad-core and dual-core Intel Xeon processors deliver high performance.

x3400 (formerly x226)

The IBM System x3400 (Figure T.5) is an excellent low-cost solution for growing businesses or branch offices that rely on 24x7 availability and mission-critical applications. Optional features let you configure a server customized for your needs—from basic file-and-print to a robust, mission-critical application server—saving you time and money.

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

For branch offices with demanding, complex data transactions, the x3400 offers dual-socket computing power and support for up to eight-core processor performance, making the x3400 an affordable yet robust system. 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-sized businesses. Reliable and easy to manage, Express models/configurations vary by country.

Here are some quick x3400 facts:

Specifications

Form factor/height	Tower/5U
Processor (max)	Dual-Core Intel Xeon Processor 5130 up to 2.0 GHz and up to 1333 MHz front-side bus or Quad-Core Intel Xeon Processor E5320 up to 1.86 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 2 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 2.0 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; 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 ServerGuide
Operating systems supported	Microsoft Windows Server 2003, Windows 2000/Advanced Server, Red Hat Linux, SUSE Linux, Novell NetWare, VMware ESX Server, SCO UnixWare, SCO OpenServer
Limited warranty	1-year or 3-year onsite limited warranty

- x3400 details on PartnerWorld

- x3400 details on IBM.com

- x3400 competitive info on COMP

Figure T.5. IBM System x3400 at a glance (and links to more detail).

- Value-priced, 2-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 (formerly x236)

The IBM System x3500 (Figure T.6) delivers unprecedented performance and reliability for demanding distributed environments 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.

Take advantage of virtualization with the x3500. Deploy an infrastructure with less hardware that supports the same—or more—applications with lower hardware support costs.

The x3500 offers many advanced availability features standard, including advanced data protection for high system reliability at no extra cost. Other high-availability features such as redundant components, advanced memory protection, integrated systems management and large storage capacity help keep your system up and running 24x7.

Select configurations of the x3500 are part of the IBM Express Portfolio, designed and priced to meet the needs of

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 X5355 up to 2.66 GHz and up to 1333 MHz front-side 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
Maximum internal storage	2.4 TB hot-swap SAS, 4 TB hot-swap SATA
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, Windows 2000/Advanced Server, Red Hat Linux, SUSE Linux, Novell NetWare, VMware ESX Server, SCO OpenServer, SCO UNIXware
Limited warranty	3-year onsite limited warranty

- x3500 details on PartnerWorld

- x3500 details on IBM.com

- x3500 competitive info on COMP

Figure T.6 IBM System x3500 at a glance (and links to more detail).

mid-sized businesses. Reliable and easy to manage, Express models/configurations vary by country.

Here are some quick x3500 facts:

- Achieve excellent price/performance with this industry-leading, two-socket server

- Stable platform life optimizes IT investment

- Manage and protect mission-critical applications with scalable memory, I/O and storage.

x3800 (formerly x260)

The IBM System x3800 (Figure T.7) delivers outstanding performance, high availability and manageability that you demand 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 IBM X3 Architecture, delivers the third generation of mainframe-inspired IBM Enterprise X-Architecture technology. 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

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 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 32-bit and 64-bit), 32- and 64-bit Red Hat Enterprise Linux and SUSE Enterprise Linux, VMware ESX Server
Limited warranty	3-year onsite limited warranty

- x3800 details on PartnerWorld

- x3800 details on IBM.com

- x3800 competitive info on COMP

Figure T.7   IBM System x3800 at a glance (and links to more detail).

- 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.

Rack-Optimized Servers

In this section, we explore the IBM System x servers that use the industry-standard rack packaging. 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

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 2.4 GHz/1066 MHz) or Intel Pentium D (dual-core) (4 MB/up to 3.4 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, Linux, Novell NetWare

- 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).

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

- Maximize and protect your IT investment with resiliency and flexibility

- A range of processor choices offering multiple levels of price/performance.

x306m

The IBM eServer xSeries 306m (Figure R.2) features easy management, deployment and service, providing outstanding performance and high availability at an entry-level price.

The x306m is an easy-to-use server ideally suited for handling Web content-serving and edge-of-network applications. Integration of industry-standard software tools and remote systems management, monitoring and alerting capabilities combine to deliver stress-free systems management and high availability.

Here are some quick x306m facts:

- Facilitates ease of management, deployment and service

Specifications

Form factor/height	22" depth/1U
Processor (L2 cache/CPU GHz/front-side bus MHz max)	Intel Pentium D (dual-core) (2 MB or 4 MB/up to 3.2/800) or single-core Intel Pentium 4 (1 MB or 2 MB/up to 3.6/800), both support Intel Extended Memory 64 Technology
Number of processors (std/max)	1/1
Memory (std/max)	512 MB/8 GB PC4200 DDR II via 4 DIMM slots
Expansion slots	2 PCI-X 64-bit/100 MHz or 1 PCI-Express x8 and 1 PCI-X 64-bit/100 MHz
Disk bays total/hot-swap	Up to 2 simple-swap Serial ATA, or 2 hot-swap Serial ATA or Serial Attached SCSI hard disk drives
Maximum internal storage	500 GB 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 ServeRAID-8e, ServeRAID-7t for simple-swap Serial ATA hard disk drives
Systems management	Automatic Server Restart, IBM Director, ServerGuide, Remote Deployment Manager, Wake on LAN, optional Remote Supervisor Adapter II
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux, Windows 2000 Server and Advanced Server, Novell NetWare
Limited warranty	1-year or 3-year onsite limited warranty

- x306m details on PartnerWorld

- x306m details on IBM.com

- x306m competitive info on COMP

Figure R.2. IBM eServer xSeries 306m at a glance (and links to more detail).

- Offers resiliency and performance in an entry-level server

- Utilizes next-generation technologies while maximizing and protecting your IT investment.

x3455 (formerly e326m)

The IBM System x3455 (Figure R.3) delivers robust performance in a small package at an affordable price. It is ideal for compute-intensive environments, helping optimize your business today and protect it tomorrow.

For scientific, technical and financial applications, the x3455 delivers ultra high-performance I/O bandwidth, speeding processor-to-processor communications—helping process data more quickly. With IBM eXtended I/O, the x3455 includes a choice of additional I/O slots, allowing your business to scale to meet future needs.

The x3455 provides superior performance with one or two dual-core processors. Take advantage of outstanding memory performance with up to 48 GB of power efficient DDR II memory and six DIMMs per processor with AMD Direct Connect architecture.

Advanced features such as power control, unattended install and remote management via Serial Over LAN (SOL) help the x3455 simplify systems management. And it excels at rapid server deployment, powering analytical computing needs.

Here are some quick x3455 facts:

- Maximize performance for your memory-intensive environments

Specifications

Form factor/height	1U rack server
Processor	AMD Dual-Core Opteron Model 2210, 2214, 2216, 2218, 2220
Number of processors (std/max)	1/2
Cache (max)	2 MB per socket
Memory (std/max)	2x512 MB/48 GB PC5300 ECC DDR II SDRAM Chipkill 667 MHz via 12 DIMM slots
Expansion slots	2 PCI-Express or 1 PCI-Express and 1 HTx
Disk bays (total)	2
Maximum internal storage	1.0 TB SATA II or 600 GB Ultra320 SAS
Network interface	Integrated dual Gigabit Ethernet
Power-total system input requirements	110W/1.1 amps
Power supply	650W capacity
RAID support	Integrated RAID-0, -1 with SAS HDDs
Systems management	Integrated Systems Management Processor (IPMI 2.0-compliant), Cluster Systems Management, IBM Director
Operating systems supported	Microsoft Windows Server 2003, Red Hat Linux, SUSE Linux
Limited warranty	1-year onsite

- x3455 details on PartnerWorld

- x3455 details on IBM.com

- x3455 competitive info on COMP

Figure R.3. IBM System x3455 at a glance (and links to more detail).

- Achieve greater flexibility and scalability with IBM eXtended I/O design

- Gain maximum solution control with on-board systems management and rapid deployment.

x3550 (formerly x336)

Designed for applications ranging from Web serving to workload consolidation and virtualization, the IBM System x3550 (Figure R.4) 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 PowerExecutive delivers advanced control to help monitor power usage and achieve decreased infrastructure, power and cooling costs. Hot-swap, redundant fans keep components cool without taking the server offline.

Select configurations of the x3550 are part of the IBM Express Portfolio, designed and priced to meet the needs of mid-sized businesses. Reliable and easy to manage, Express models/configurations vary by country.

Specifications

Form factor/height	Rack/1U
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 X5355 up to 2.66 GHz and up to 1333 MHz frontside bus
Number of processors (std/max)	1/2
L2 cache	2x2 MB (dual-core) and 2x4 MB (quad-core)
Memory (std/max)	1 GB or 2 GB/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 or 4/4
Maximum internal storage	293.6 GB hot-swap SAS or up to 1.5 TB simple-swap SATA
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 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, 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 onsite limited warranty

- x3550 details on PartnerWorld

- x3550 details on IBM.com

- x3550 competitive info on COMP

Figure R.4 IBM System x3550 at a glance (and links to more detail).

Here are some quick x3550 facts:

- High-performance design to maximize your IT investment

- Improved business availability with IBM Xtended Design Architecture features

- New design and tools for optimized power management.

x3650 (formerly x346)

For constrained data center environments, the IBM System x3650 (Figure R.5) offers unprecedented performance and reliability. Optimized for up to eight-core processor performance, the x3650 delivers rack-dense, dual-core or quad-core computing power, an impressive 12 DIMM memory design and super-efficient network communication.

Innovation comes standard on the x3650. Anywhere/anytime management keeps assets under control.

IBM PowerExecutive 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.

Here are some quick x3650 facts:

- Get superior performance with new dual-core or quad-core processors and faster memory

- Use new integrated solutions to manage your resources

- Protect IT investments with scalable memory, I/O and storage on a long-life server platform.

Specifications

Form factor/height	Rack/2U
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 X5355 up to 2.66 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 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 3.0 TB hot-swap SATA
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, -10, optional RAID-5, -6
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, 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
Limited warranty	3-year onsite limited warranty

- x3650 details on PartnerWorld

- x3650 details on IBM.com

- x3650 competitive info on COMP

Figure R.5. IBM System x3650 at a glance (and links to more detail).

x3650 T (formerly x343)

The IBM System x3650 T (Figure R.6) takes carrier-grade servers and next-generation networks to new levels. Built especially for network equipment providers and service providers, this powerful NEBS-3/ETSI-compliant server is rich in

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 Linux, SUSE Linux
Limited warranty	3-year limited warranty

- x3650 T details on PartnerWorld

- x3650 T details on IBM.com

- x3650 T competitive info on COMP

Figure R.6. IBM System x3650 T at a glance (and links to more detail).

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 rackmount server.

x3650 NAS

IBM System x3650 NAS (Figure R.7) separates dedicated file-serving functions from application operations thereby relieving the CPU from being overburdened. With the Windows Storage Server 2003 R2 Operating System and IBM Tivoli Continuous Date Protection (CDP) transparent backup software, achieve higher performance and save valuable network bandwidth and critical user productivity.

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
Limited warranty	3-year onsite limited warranty

- x3650 NAS details on PartnerWorld

- x3650 NAS details on IBM.com

- x3650 NAS competitive info on COMP

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

IBM storage servers offer many of the benefits of shared pool storage solutions like storage area networks (SANs) but without complicated installation and administration. These also support heterogeneous clients and servers utilizing common network access protocols: NFS for UNIX and Linux servers, and CIFS. A remotely accessible user interface helps manage print and file quotas and easily integrate into existing AD environments.

The preconfigured ServerProven hardware and IBM ServeRAID reliability make this an optimized solution that decreases capital equipment costs and reduces IT staff hours. By making storage devices LAN addressable, this frees storage from direct attachment to a consolidated server and enables any-to-any connectivity, which can be clustered for failover redundancy.

Here are some quick x3650 NAS facts:

- Get storage growth consolidation and central management locally and remotely

- Use in minutes and manage easily with the preloaded and preconfigured storage solution

- Protect IT investments with flexible end-user backup and a gateway to existing storage networks.

x3655

The IBM System x3655 (Figure R.8) supports applications that require memory-intensive performance. With features such as dual-core processors, 16 available DIMMs with up to 64 GB of

Specifications

Form factor/height	2U
Processor (max)	AMD Dual-Core Opteron Model 2218 (2.6 GHz)
Number of processors (std/max)	1/2
Memory (max)	64 GB DDR II 667 MHz via 16 DIMMs
Expansion slots	Standard: 2 PCI-E x8 (low-profile) and 1 PCI-E x4 (low-profile); Optional: 1 HTx (full-height/full-length) Riser, 1 PCI-X 133 MHz (full-height/full-length) or 1 PCI-E x16 (full-height/full-length) Riser
Disk bays (total/hot-swap)	Eight 2.5" hot-swap SAS hard disk drives (HDDs) or six 3.5" hot-swap SAS/SATA HDDs
Maximum internal storage	1.8 TB hot-swap SAS or 3 TB hot-swap SATA or 584 GB hot-swap SAS
Network interface	Integrated dual Gigabit Ethernet with TOE
Power supply (std/max)	835W 1/2
Hot-swap components	Power supply, hard disk drives, cooling fans
RAID support	RAID-0, -1, -10 standard, RAID-5, -6, -10, -50, -60 and battery backup optional
Systems management	Baseboard Management Controller IPMI 2.0 standard, Remote Supervisor Adapter II SlimLine optional
Operating systems supported	Microsoft Windows 2003 (32-/64-bit), Red Hat Enterprise Linux 4 (64-bit), SUSE Linux Enterprise Server 9 (32-/64-bit), VMware
Limited warranty	3-year onsite

- x3655 details on PartnerWorld

- x3655 details on IBM.com

- x3655 competitive info on COMP

Figure R.8.   IBM System x3655 at a glance (and links to more detail).

DDR II memory and robust I/O, customers can configure to meet their needs. The IBM PowerExecutive 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. Leverage AMD Opteron performance and IBM reliability to help improve your competitiveness.

Here are some quick x3655 facts:

* Maximize reliability and performance for enterprise applications that are key to your business

* Achieve greater flexibility and scalability with IBM eXtended I/O and design

* Save time and money through efficient power management, systems management and deployment.

x3755

The IBM System x3755 (Figure R.9) provides breakthrough performance for high performance computing applications that demand maximum memory availability. With unique AMD design architecture, including integrated memory controller and HyperTransport technology, the x3755 is advantaged for applications requiring low latency and high speed access to memory data.

With a choice of up to four dual-core processors, the x3755 is designed to deliver superior floating-point performance at

Specifications

Form factor/height	4U
Processor (max)	AMD Dual-Core Opteron Model 8220 (2.8 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 4.0 (32-bit/64-bit), SUSE Linux Enterprise Server 9.0 (32-bit/64-bit), VMware ESX Server 3.0
Limited warranty	3-year onsite

- x3755 details on PartnerWorld

- x3755 details on IBM.com

- x3755 competitive info on COMP

Figure R.9. IBM System x3755 at a glance (and links to more detail).

an entry price. Flexible configurations allow customers to upgrade to meet their needs, optimizing for price or maximizing for performance. The x3755 provides investment protection with support for future quad-core processors, allowing customers to upgrade to the latest technology when it becomes available. The x3755 excels at high-speed memory access—critical for high performance computing applications. It delivers the memory capacity and speed demanded by scientific and technical computing. Whether your business environment is running 32-bit or 64-bit applications, having access to your data quickly is critical. The x3755 provides maximum memory availability in a four-socket system.

Here are some quick x3755 facts:

- Achieve extreme performance for compute-intensive applications at an entry price

- Outstanding leadership I/O performance through innovative HTx design

- Deliver the best performance per watt with this cost-effective solution for high performance computing.

x3850 (formerly x366)

The IBM System x3850 (Figure R.10) delivers outstanding performance, extremely low latency and high availability and manageability along with advanced, integrated technologies that help protect your IT investment. The x3850 is designed with IBM X3 Architecture, the third generation of mainframe inspired IBM Enterprise X-Architecture Technology, and 64-bit

Specifications

Form factor/height	Rack/3U
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 (std/max)	2 GB or 4 GB/64 GB PC2-3200 DDR II SDRAM
I/O slots (total/hot-swap)	6/6, two Active PCI-X 2.0/266 MHz and four PCI-Express x8
Disk bays (total/hot-swap)	6/6 2.5" Serial Attached SCSI (SAS)
Maximum internal storage	440.4 GB Serial Attached SCSI
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	1300W 1 or 2/2 hot-swap
Hot-swap components	Power supplies, fans, memory, hard disk drives and PCI-Express/PCI-X adapters
RAID support	RAID-0, -1, -5 optional (ServeRAID-8i)
Systems management	IBM Alert on LAN, Automatic Server Restart, IPMI 2.0, IBM Director, IBM ServerGuide, Remote Supervisor Adapter II SlimLine integrated (model dependent), light path diagnostics (independently powered), Predictive Failure Analysis on hard disk drives, processors, VRMs, fans and memory, IBM Wake on LAN
Operating systems supported	Microsoft Windows Server 2003 (Standard and Enterprise editions 32-bit and 64-bit), Red Hat Linux, SUSE Linux, Microsoft Windows 2000 (Server and Advanced Server), VMware ESX Server
Limited warranty	3-year onsite limited warranty

- x3850 details on PartnerWorld

- x3850 details on IBM.com

- x3850 competitive info on COMP

Figure R.10. IBM System x3850 at a glance (and links to more detail).

Intel Xeon Processors MP. Driving mission-critical applications, including Enterprise Resource Planning, database serving or custom-developed, Java technology-based applications like IBM WebSphere software, the x3850 excels at performing transaction-intensive, back-office functions.

The x3850 provides more computing power in a smaller form factor (3U) than many competitive models, giving organizations powerful commercial application-hosting capabilities in a compact design. It delivers up to 16 times the memory addressing and up to three times the CPU bus bandwidth compared to previous server designs. Using the IBM XA-64e chipset, the x3850 sets a new standard for industry-leading 4-processor x86 performance by intelligently managing frequently accessed data.

Here are some quick x3850 facts:

- Delivers breakthrough, four-processor performance with 64-bit memory addressability through IBM X3 Architecture, the third generation of IBM Enterprise X-Architecture

- Supports high-performance, dual-core 64-bit Intel Xeon Processors MP and runs 32- and 64-bit applications simultaneously, providing headroom and 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.

High-performance Scalable Servers

In this section, we examine the most powerful xSeries servers. Here, the focus is on maximizing performance, capacity, and availability in order to meet mission-critical business needs.

x3950 (formerly x460)

The IBM System x3950 (Figure S.1) is built on IBM X3 Architecture that delivers mainframe-inspired enhancements to the high-performance x86 server industry. With a balanced focus on providing breakthrough 64-bit performance and high

> **MORE ON THE WEB**
>
> • Overview of all xSeries "high-performance" servers

availability, the x3950 is designed for the changing business needs of enterprise customers—at a low entry price point.

This flagship System x™ server introduces improved modularity and partitioning with its 3U, 4 CPU, 6 I/O slot modular building-block design. Starting with a base two-processor configuration, add CPU, I/O and memory capacity incrementally as your business needs change, scaling up to 32 processors across eight chassis. Take advantage of the configuration flexibility of the x3950 to build the optimal system for scale-up database and Enterprise Resource Planning or scale-out virtualization for server consolidation.

Here are some quick x3950 facts:

• Delivers breakthrough performance with 64-bit memory addressability through IBM X3 Architecture, the third generation of IBM Enterprise X-Architecture

Specifications

Form factor/height	Rack/3U per chassis
Processor (max)	Intel Xeon Processor MP up to 3.50 GHz (dual-core)/667 MHz front-side bus
Number of processors (std/max)	2/4 per chassis, 32 per configuration
Cache (max)	Up to 2 MB L2 and up to 16 MB L3
Memory (std/max)	2 GB or 4 GB/64 GB PC2-3200 DDR II per chassis, 512 GB maximum
Disk bays (total/hot-swap)	6/6 (per chassis) 2.5" Serial Attached SCSI (SAS)
Maximum internal storage	440.4 GB SAS per chassis (supports 36.4 GB and 73.4 GB hard disk drives)
I/O slots (total/hot-swap)	6/6 (per chassis) Active PCI-X 2.0, all slots supporting up to 266 MHz
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	1300W 220V 2/2
Hot-swap components	Power supplies, fans, memory, HDDs and PCI-X adapters
RAID support	Integrated RAID-0, -1, -5 (model dependent)
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
Operating systems supported	Microsoft Windows Server 2003 (Standard, Enterprise and Datacenter editions 32-bit and 64-bit), 32- and 64-bit Red Hat Enterprise Linux and SUSE Enterprise Linux, Microsoft Windows (Server and Advanced Server), VMware ESX Server
Limited warranty	3-year onsite limited warranty

- x3950 details on PartnerWorld

- x3950 details on IBM.com

- x3950 competitive info on COMP

Figure S.1. IBM System x3950 at a glance (and links to more detail).

- Supports high-performance, dual-core 64-bit Intel Xeon Processors MP, and runs 32- and 64-bit applications simultaneously providing headroom and investment protection

- Features IBM XpandOnDemand scalability, allowing you to pay-as-you-grow with up to 32 high-performance, 64-bit Intel Xeon Processors MP

- Leverages years of IBM virtualization and partitioning expertise and the enterprise-proven reliability of IBM mainframe servers.

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 Server?

The term "blade" refers to a thin, ultra dense card that houses microprocessors, memory, disk storage, networking, and other functions. Multiple blades are inserted into a standardized, rack-mounted, mechanical box called a "chassis" like books into a bookshelf. The resulting computer system is called a "blade server." 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 blade server concept very popular

and in keeping with the attributes of an On Demand Operating Environment.

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 Calibrated Vector Cooling 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.

The development of IBM BladeCenter (as well as all of IBM's server lines) is guided by the IBM Systems Agenda, which has three tenets that help our clients in becoming an On Demand Business:

Collaborative Innovation—IBM BladeCenter can help implement business solutions faster and help drive transformation in your company by offering the extensive range of IBM expertise in servers, storage, middleware and technical support.

Openness—IBM BladeCenter can help you attain a more flexible IT infrastructure without disrupting business. IBM is committed to providing the best solution for each client's needs and more of the products and applications you need, when you need them.

Virtualization—IBM is committed to helping clients like you improve utilization of your IT systems and increase staff productivity, using proven industry-leading virtualization capabilities integrated throughout the full range of IBM server and storage offerings.

IBM BladeCenter can help you implement new applications and functions affordably to address more and better business opportunities. With easily integrated IBM products providing a highly secure and robust platform for information sharing, you can more easily attain a collaborative working environment, keep your business up and running, and attain high levels of business resiliency.

BladeCenter servers have four elements:

Chassis—the mechanical enclosure that holds everything else, including various optional modules that fit into bays in the chassis to provide additional function. The chassis is designed to be installed in a rack.

Modules—components that are installed in hot-swap module bays provided in the BladeCenter chassis. These modules provide a number of common functions needed by the installed blades, the chassis, and the other modules. Modules include things like power supplies, systems management 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.

Blades—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 processor-based, AMD processor-based, or POWER microprocessor-based like p5 servers. The Intel and AMD processor-based blade servers support the Windows Server and Linux operating systems, which can run concurrently in a single BladeCenter using partitioning functions. The POWER microprocessor-based blade servers support the AIX and Linux operating systems, which again can be run concurrently.

Expansion options—cards installed in the chassis 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.

Original BladeCenter Chassis

With 14 server bays, the original BladeCenter chassis (Figure C.1) enables you to pack up to 84 two-way servers into an industry-standard rack. High-performance density helps you concentrate as much computing power as possible into your data center. Innovative design reduces cables by up to 83 percent, saving you installation time and money.

There is also a lower cost BladeCenter Express chassis designed for small-scale installations. It offers the same high-

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

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

availability features of BladeCenter without some of the storage and redundant management features.

Here are some quick BladeCenter chassis facts:

- A 7U rack-optimized chassis

- Up to 14 blade server bays for extreme performance density

- Two 2,000 watt power supplies for power redundancy; additional power supply options available

- Two hot-swap blowers

- One advanced management module with built-in KVM support

- Ability to integrate Ethernet networking

- DVD and diskette drive standard

- Support for BladeCenter HS20, HS40, JS20, JS21, and LS20 blades feature Intel Xeon DP and MP, AMD Opteron, and PowerPC processors.

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.2).

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

Figure C.2.   IBM BladeCenter T chassis (and links to more detail).

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

Here are some quick BladeCenter T chassis facts:

- NEBS 3/ETSI compliance enables equipment operability under the environmental extremes found in a central office

- 8U rack-optimized chassis accepts Intel 2W and 4W processor-based blade servers

- 8U rack-optimized chassis

- Up to eight blade server bays for significant performance density

- Up to four integrated and hot-swappable Gigabit Ethernet switch modules or two Gigabit Ethernet and two Fibre Channel switch modules

- Designed to meet the rigorous NEBS 3/ETSI standards for electromagnetic compatibility, thermal robustness, fire resistance, earthquake and office vibration resistance and airborne contaminant resistance

- Up to four hot-swap and redundant 1300-watt power supply modules with load balancing and failover capabilities.

BladeCenter H Chassis

BladeCenter delivers a flexible, adaptable, modular design that has revolutionized the blade server market since its announcement in 2002. With the introduction of the newest family member, IBM BladeCenter H shown in Figure C.3, you can take advantage of even more powerful performance and features while preserving your existing BladeCenter investment.

BladeCenter H offers a host of new features and functionality, making it the ideal platform to run your next-generation, high-performance business-critical applications. Designed to support full-performance 4X InfiniBand fabrics and future applications requiring 10 Gb Ethernet or 10 Gb Fibre Channel, BladeCenter H is optimized for today's IT environment and

- 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 (and links to more detail).

primed for future applications. While virtualization is nothing new to the BladeCenter family, BladeCenter H takes it to the next level by enabling server, storage, and I/O virtualization across multiple chassis of blades, making it ideal for even the most demanding IT environments.

BladeCenter H offers exceptional efficiency for mission-critical environments. Whether you're limited by space constraints, cooling capacity, or IT personnel, BladeCenter allows you to get the most from limited resources.

Here are some fast BladeCenter H facts:

- Depend on compatibility across the entire IBM BladeCenter family of products to help enhance investment protection.

- Leverage flexibility to choose the applications, operating system and configurations that best suit your business needs.

- Drive greater IT simplification via solution simplification at the rack level using new flexible I/O virtualization.

BladeCenter HT Chassis

IBM BladeCenter HT (Figure C.4) 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.

- BladeCenter HT details on PartnerWorld
- BladeCenter HT details on IBM.com
- BladeCenter HT competitive info on COMP

Figure C.4.   IBM BladeCenter HT at a glance (and links to more detail).

Here are some quick BladeCenter HT Chassis facts:

- Integrates the server blades, switches, networking, storage, I/O, and management platforms that are supported across the BladeCenter family

- Helps reduce network infrastructure costs with an open, standards-based, commercial off-the-shelf (COTS) platform supporting a large portfolio of world-class, next-generation network (NGN) solutions and applications

- Increases network infrastructure performance with dual-core and quad-core Intel, AMD and IBM POWER processor blades

- Dramatically increases high-speed connectivity and through-put with multi-terabit networking (more than 1.2 Tbps throughput on backplane) and 40 Gbps per blade server

- Improves network flexibility and interoperability by bridging new services to control gateways supporting SS7, VoIP, legacy PSTN, WAN devices and network interfaces with special pur-pose telecommunications blades

- Efficiently consolidates network resources while delivering high scalability for NGN applications such as IPTV, VoD and IMS, with higher port concentrations and 10 Gbps Ethernet network bandwidth

- Supports numerous operating systems and applications, in-cluding Linux, Windows, AIX and Sun Solaris 10—allowing you to choose the ones that best suit your needs in a single platform

- Leverages carrier grade reliability with an NEBS 3/ETSI chassis certified to Level 3 by Underwriters Laboratories Inc. (UL)

- Helps simplify administration and maximize the efficiency of network management staffs through integrated management tools to help lower costs and improve control of the central office and/or data center (IBM Director)

- Increases flexibility and choice with a single family of com-patible systems, designed for deployment in a telecom cen-tral 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:

- Intel Blades

- AMD Blades

- POWER Blades.

Intel Blades

These blade servers are based on Intel processors and are named using an "HS" prefix.

HS20

The IBM BladeCenter HS20 (Figure H.1) is designed to support high-performance Intel Xeon Processors and are packed with high-availability features. The HS20 delivers density without sacrificing processor performance or availability.

Here are some fast HS20 facts:

- High-density modular blade server designed to support the entire family of BladeCenter chassis

- Designed to take less time to install and fewer people to maintain, helping reduce IT infrastructure costs

- Intel Extended Memory 64 Technology provides a smooth transition to 64-bit applications without sacrificing price-per-formance

Specifications

Processor	Intel Xeon Processor up to 3.80 GHz (some models support Intel EM64T)
Number of processors (std/max)	1/2
Cache (max)	1 MB or 2 MB (model dependent)
Memory (std/max)	Up to 16 GB PC2-3200 DDR2
Internal hard disk drives	Up to 2 Ultra320 SCSI HDDs installed on each blade (or plus support for up to 2 hot-swap Ultra320 SCSI drives with optional SCSI Storage Expansion Unit)
Maximum internal	746.8 GB (with optional SCSI Storage Expansion Unit) storage
RAID support	Integrated RAID-1 standard on blade server, integrated RAID-1E with SCSI Expansion Unit 2 option (on select blades)
Network	Dual Gigabit Ethernet
I/O upgrade	1 expansion card connection
Systems management hardware	Integrated systems management processor
Limited warranty	3-year on-site limited warranty for parts and labor

- HS20 details on PartnerWorld

- HS20 details on IBM.com

- HS20 competitive info on COMP

Figure H.1. IBM BladeCenter HS20 at a glance (and links to more detail).

- Two-processor scalability enables scaling up to meet computing requirements.

HS20 ultra low power

The IBM BladeCenter HS20 ultra low power (Figure H.2) is designed to support high-performance Intel Xeon Processors

Specifications

Processor	Intel Xeon dual-core ultra low-power processor up to 2 GHz
Number of processors (std/max)	1/2
Cache (max)	1 MB or 2 MB (model dependent)
Memory (std/max)	Up to 16 GB PC2-3200 DDRII
Internal hard disk drives	Up to 2 SAS HDDs installed on each
Maximum internal storage	146 GB
RAID support	Integrated RAID 0,1 standard on blade server
Network	Dual Gigabit Ethernet
I/O upgrade	1 expansion card connection
Systems management hardware	Integrated systems management processor
Limited warranty	3-year on-site limited warranty for parts and labor

- HS20 ultra low power details on PartnerWorld

- HS20 ultra low power details on IBM.com

- HS20 ultra low power competitive info on COMP

Figure H.2. IBM BladeCenter HS20 ultra low power at a glance (and links to more detail).

and provides high-availability features. As such, it delivers density and power efficiency without sacrificing processor performance or availability.

Here are some fast HS20 ultra low power facts:

- High-density modular blade server designed to support the entire family of BladeCenter chassis

- Designed to take less time to install and fewer people to maintain, helping reduce IT infrastructure costs

- Ultra low power Intel Xeon dual-core processors provide excellent performance per watt

- Two-processor scalability enables scaling up to meet computing requirements.

HS21

The IBM BladeCenter HS21 (Figure H.3) is designed to support high-performance Dual-Core or Quad-Core Intel Xeon Processors. Packed with high-performance and high availability features, the HS21 blade delivers density without sacrificing processor performance or availability.

Here are some quick HS21 facts:

- High-density modular blade server designed to support the entire family of BladeCenter chassis

- Designed to take less time to install and fewer people to maintain, helping reduce IT infrastructure costs

- Support for dual-core or quad-core processors provide the performance needed for even the most demanding applications

Specifications

Processor	Dual-Core Intel Xeon Processor up to 3 GHz or Quad-Core Intel Xeon Processor X5355 up to 2.33 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
Cache (max)	4 MB L2 shared (dual-core) or 2x4 MB L2 (quad-core)
Memory (std/max)	Up to 32 GB Fully Buffered DIMM
Internal hard disk drives	Up to two Small Form Factor (2.5") 10,000 rpm SAS HDDs installed on each blade (plus support for up to 3 hot-swap SAS drives with optional Storage and I/O blade)
Maximum internal storage	367 GB (with optional SIO blade)
RAID support	Integrated RAID-0 or -1 standard on blade server, integrated RAID-1E or RAID-5 with optional SIO blade
Network	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)
Systems management hardware	Integrated systems management processor
Limited warranty	3-year onsite limited warranty for parts and labor

- HS21 details on PartnerWorld

- HS21 details on IBM.com

- HS21 competitive info on COMP

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

- Featuring new high-speed fabrics with BladeCenter H to deliver greater bandwidth and performance

- Helps reduce power and cooling costs while delivering substantial performance gains over earlier technology—true performance efficiency.

HS21 XM

Designed to support high-performance Dual-Core or Quad-Core Intel Xeon Processors and packed with high availability features, the HS21 XM blade (Figure H.4) delivers density without sacrificing processor performance or availability.
Here are some quick HS21 XM facts:

- High-density modular blade server designed to support the entire family of BladeCenter chassis

- Higher internal memory combined with multi-core processors at 64-bit delivers leadership performance for multi-threaded applications

- Featuring new high-speed fabrics with BladeCenter H to deliver greater bandwidth and performance

- Supports new IBM 4 GB Modular Flash Drive for optimized durability, reliability and power efficiency

- Helps reduce power and cooling costs while delivering substantial performance gains over earlier technology—true performance efficiency.

Specifications

Processor	Dual-Core Intel Xeon 5160 up to 3.00 GHz or Quad-Core Intel Xeon E5345 up to 2.33 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/2
Cache (max)	4 MB L2 shared (dual-core) or 2x4 MB L2 (quad-core)
Memory (std/max)	Up to 32 GB with Fully Buffered DIMMs
Internal hard disk drives	One Small Form Factor (2.5") 10,000 rpm SAS HDD installed on each blade and one optional internal IBM 4 GB Modular Flash Drive (plus support for up to 3 hot-swap SAS drives with optional Storage and I/O blade)
Maximum internal storage	587.2 GB (with optional SIO blade)
RAID support	Integrated RAID-0 or -1 standard on blade server, integrated RAID-1E or RAID-5 optional with SIO Blade
Network	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)
Systems management hardware	Integrated system management processor
Limited warranty	3-year onsite limited warranty for parts and labor

- HS21 XM details on PartnerWorld
- HS21 XM details on IBM.com
- HS21 XM competitive info on COMP

Figure H.4. IBM BladeCenter HS21 XM at a glance (and links to more detail).

AMD Blades

These blade servers are based on AMD processors and are named using the "LS" Prefix.

LS20

Extend the capabilities of your high-density BladeCenter with LS20 for BladeCenter blade servers (Figure L.1) that include AMD Opteron 32- or 64-bit processors. These low power, full-performance Opteron processors are ideal for clients concerned with power consumption and heat output. They help to reduce the operational cost in deploying these blades. The Opteron processors support 32 and 64-bit operating systems from Linux Red Hat, SUSE Linux, and Microsoft. These processors can also run in legacy mode (where a 32-bit application runs under a 64-bit operating system) and remain fully compatible with 32-bit applications and operating systems.

Here are some quick LS20 facts:

• High-density modular blade server designed to support the entire family of BladeCenter chassis

• Designed to take less time to install and fewer people to maintain, helping reduce IT infrastructure costs

• Provides a smooth transition to 64-bit applications without sacrificing the price/performance of the existing ecosystem

• Two-processor scalability enables scaling up to meet computing requirements.

Specifications

Processor	AMD Opteron Model 246, 250, 252, 254, 270, 275 and 280
Number of processors (std/max)	1/2
Cache	1 MB L2 per processor core
Memory	Up to 16 GB DDR VLP memory
Internal hard disk drives	Up to 2 Ultra320 SCSI HDDs
Maximum internal storage	146.80 GB
Network	2 integrated Gigabit Ethernet controllers
I/O upgrade	1 expansion card connection
Systems management hardware	Integrated systems management processor

- LS20 details on PartnerWorld

- LS20 details on IBM.com

- LS20 competitive info on COMP

Figure L.1. IBM BladeCenter LS20 at a glance (and links to more detail).

LS21

The LS21 blade server (Figure L.2) delivers performance, high density and availability for the data center. The integrated sys-

Specifications

Processor	AMD Opteron Model 2210HE, 2212, 2212HE, 2216HE and 2218
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 storage 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

- LS21 details on PartnerWorld

- LS21 details on IBM.com

- LS21 competitive info on COMP

Figure L.2. IBM BladeCenter LS21 at a glance (and links to more detail).

tems management processor, light path diagnostics and Predictive Failure Analysis combine to provide powerful management capabilities and the best performance/watt solution. You can

easily add or change blades without disrupting the operation of other blades installed in the chassis. IBM PowerExecutive tool provides the system intelligence needed to provide effective power-consumption management in the data center. PowerExecutive can "meter" actual power usage and trend data for any single physical system or group of systems.

Here are some quick LS21 facts:

- High-density modular blade server designed for use in the entire family of IBM BladeCenter chassis

- Designed to take less time to install and fewer people to maintain, helping reduce IT infrastructure costs

- Provides a smooth transition to 64-bit applications without sacrificing the price/performance of the existing ecosystem

- Two dual-core processors matched with plenty of memory to handle the most demanding workloads.

LS41

The LS41 blade server (Figure L.3) delivers performance, high density and availability for the data center. The integrated system management processor, light path diagnostics and Predictive Failure Analysis combine to provide powerful management capabilities and the best performance/watt. You can easily add or change blades without disrupting the operation of other blades installed in the chassis. IBM PowerExecutive tool provides the system intelligence needed to provide effective power-consumption management in the data center.

Specifications

Processor	AMD Opteron Model 8212, 8212HE, 8216, 8216HE and 8218
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 hardware	Integrated systems management processor

- LS41 details on PartnerWorld

- LS41 details on IBM.com

- LS41 competitive info on COMP

Figure L.3. IBM BladeCenter LS41 at a glance (and links to more detail).

PowerExecutive can "meter" actual power usage and trend data for any single physical system or group of systems.

Here are some fast LS41 facts:

- High-density modular blade server designed for use in the entire family of BladeCenter chassis

- Designed to take less time to install and fewer people to maintain, helping reduce overall IT infrastructure costs

- Provides a smooth transition to 64-bit applications without sacrificing the price/performance of the existing ecosystem

- Up to four dual-core processors matched with plenty of memory to handle the most demanding workloads.

POWER Blades

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

JS20

The BladeCenter JS20 (Figure J.1) represents a convergence of leadership, combining AIX and BladeCenter into a single, highly reliable, high-performance blade server. With the 64-bit PowerPC 970FX processor delivering two-core performance at 2.20 GHz and up to 8 GB of ECC DDR memory, the JS20 is perfect for WebSphere on AIX or AltiVec technology-optimized HPC workloads on Linux.

Here are a few JS20 quick facts:

Specifications

Processor	64-bit IBM PowerPC 970FX at up to 2.20 GHz
Number of processors (std/max)	2/2
Level 2 cache	512 KB
Memory bus	1.10 GHz
Memory (std/max)	Up to 8 GB DDR ECC SDRAM
Internal hard disk drives	Up to 2 IDE
Maximum internal storage	120 GB
Network	2 integrated Gigabit Ethernet controllers
I/O upgrade	1 expansion card connection
Systems management hardware	Integrated systems management processor
Limited warranty	3-year CRU and onsite limited warranty

- JS20 details on PartnerWorld

- JS20 details on IBM.com

- JS20 competitive info on COMP

Figure J.1   IBM BladeCenter JS20 at a glance (and links to more detail).

- High-density blade server compatible with BladeCenter, BladeCenter H and BladeCenter T

- Two single-core, 64-bit PowerPC 970FX processors up to 2.20 GHz standard

- 1 GB standard/8 GB max PC2700 ECC DDR memory

- Up to two IDE hard disk drives, for 120 GB maximum internal storage

- Integrated dual Gigabit Ethernet controller with load-balancing and failover support

- Integrated system management processor for light path diagnostics, First Failure Data Capture and environmental monitoring and alerting

- High Performance Computing—optimized with support for Myrinet and InfiniBand

- Support for IBM Director and Cluster Systems Management.

JS21

The BladeCenter JS21 (Figure J.2) represents a convergence of leadership and value, combining support of AIX 5L, IBM's industrial-strength UNIX, Linux, Advanced POWER Virtualization and AltiVec SIMD acceleration into a single, highly reliable, high-performance blade server.

Combining AIX 5L and Linux support with the high-speed BladeCenter H chassis, the JS21 delivers leadership SIMD acceleration for data-intensive or floating-point-intensive scientific applications.

Here are some quick JS21 facts:

- Premier blade solution for 64-bit UNIX, HPC Linux clusters and server consolidation

- Now available as a 2.3 GHz 4-core SMP for value oriented clients

Specifications

Form factor	Single-wide blade server for BladeCenter
Processors	64-bit IBM PowerPC 970MP with integrated AltiVec SIMD accelerator
Number of processors	2-socket single-core (2.7 GHz) or 2-socket dual-core (2.3 GHz or 2.5 GHz)
Level 2 (L2) cache	1 MB per core
Memory (std/max)	1 GB (2-core) or 2 GB (4-core); up to 16 GB maximum per blade; 400 or 533 MHz ECC Chipkill DDR2 SDRAM; 4 DIMM slots
Internal disk storage	Up to two 2.5" Serial Attached SCSI (SAS) 10K RPM 36 GB or 73 GB non-hot-swap hard drives per blade, maximum 146 GB
RAID support	Integrated controller for RAID 0/10 mirroring
Networking	Integrated Broadcom 5780 17X PCI-Express 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
Advanced POWER Virtualization	Virtual LAN, POWER Hypervisor, Micro-Partitioning, Shared processor pool, Virtual I/O Server, 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 above, SUSE Linux Enterprise Server (SLES) 9 for POWER and above, Red Hat Enterprise Linux (RHEL) AS 4 for POWER and above

- JS21 details on PartnerWorld

- JS21 details on IBM.com

- JS21 competitive info on COMP

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

- Compatible with IBM BladeCenter, BladeCenter H and BladeCenter T chassis for deployment flexibility

- Can take advantage of IBM Advanced POWER Virtualization.

JS21 Express

The IBM BladeCenter JS21 Express blade server (Figure J.3) 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 in the market.

Here are some quick JS21 Express Facts:

- Pre-configured JS21 blade server optimized with fast memory and lots of storage

- Combines deployment flexibility of IBM BladeCenter with ease of management

- Takes advantage of virtualization technologies to help increase utilization and decrease costs.

Switch Modules

In this section, we examine some switch modules used to add function within a BladeCenter.

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.3. IBM BladeCenter JS21 Express at a glance (and links to more detail).

Ethernet

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

Cisco Gigabit Ethernet

The Cisco Systems 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.

Here are some quick Cisco Gigabit Ethernet Switch facts:

> **MORE ON THE WEB**
>
> • Cisco Gigabit Ethernet info on PartnerWorld
> • Cisco Gigabit Ethernet info on IBM.com

- 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 Gigabit Ethernet

The Cisco Systems Fiber Intelligent Gigabit Ethernet Switch Module (IGESM) 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 inter-facing to a customer's existing fiber-based data network using Cisco standard Small Form Factor Pluggable (SFP) modules.

MORE ON THE WEB
• IGESM info on PartnerWorld
• IGESM info on IBM.com

Here are some quick 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 new 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 rout-ing capabilities to each server within a BladeCenter chassis.

Such consolidation flattens the topology of the data center infrastructure through convergence of storage and data net-works, thus reducing the number of discrete devices, man-agement consoles, and different management systems.

Here are some quick Nortel 10 Gb Ethernet Switch facts:

- 10 Gb Ethernet connectivity to all server blades within a chassis

- 200 Gbps aggregate switching capacity (20 ports at 10 Gb per port) and 400 Gbps full duplex

- Full Layer 2 Switching and Layer 3 Routing to provide flexible in-chassis traffic management and sophisticated security

- Fiber XFP interconnect options (SR or LR) with six 10 Gb ports and one copper 1 Gb management port (RJ-45)

- High-availability features for simplified deployment and lower Total Cost of Ownership (TCO)

- Dual 10 Gb Ethernet connectivity from each blade server to high-speed switch bays

- Lower cost 10 Gb connectivity enabled by direct 10 Gb con-nections over BladeCenter H midplane, eliminating the need for XFPs between the blade and switch modules

- Higher performance through support of iSCSI and TCP/IP offload protocols.

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.

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. 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

MORE ON THE WEB

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

- 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.

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

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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

- 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.

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

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

- 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 Ethernet 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

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

- 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-sized 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 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-sized business customers

MORE ON THE WEB

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

- 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

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

Brocade 10-port 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 Brocades proven Silkworm technology and is fully backward compatible and interoperable with Silkworm and IBM TotalStorage b-type SAN switches.

QLogic 10-port 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 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.

McDATA 10-port and 20-port 4 Gb Fibre Channel

The McDATA 10-port and 20-port Fibre Channel Switch Modules are designed to address the needs of small, medium, and large SAN environments. These high performing, simple-to-use switches deliver up to six external ports for 1, 2, and 4 Gbps fabrics. These switches can be used to create a wide range of high-performance SAN solutions from single-switch configurations to multi-switch data centers. Easy to deploy, these switches provide centralized management as well as McDATA-capable fabric services. Along with the industry-leading net-

> **MORE ON THE WEB**
>
> - McDATA Fibre Channel Switch info on PartnerWorld
> - McDATA Fibre Channel Switch info on IBM.com

work and storage flexibility of IBM BladeCenter, this offering delivers the functionality, performance, manageability, scalability, and security required by demanding storage area networks (SANs).

Here are some quick McDATA Fibre Channel Switch facts:

- Enables high-performance end-to-end 1, 2 and 4 Gigabits per second SAN solutions

- Allows seamless integration of BladeCenter into McDATA environments

- Affordable 10-port and 20-port offerings available—ideal for small, medium and enterprise business needs

- Easy-to-use software upgrade doubles your 10-port switch connectivity to 20 ports for on demand scalability

- Includes McDATA SANbrowser—easy-to-use embedded Web GUI to configure, manage, and maintain your McDATA SAN

- Provides nondisruptive code load activation using McDATA HotCAT Functionality

- Supports optional McDATA SANtegrity Security software to help protect data and manage data access.

InfiniBand

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.

Cisco InfiniBand

The Cisco InfiniBand Switch Module for IBM BladeCenter and the Cisco InfiniBand HCA Expansion Card enable organizations to leverage the InfiniBand standard to create HPC solutions based on cost-effective BladeCenter blade clusters. Blade-Center with the Infini-Band switch solution delivers a potent com-bination of exception-ally high-connection

MORE ON THE WEB
• Cisco InfiniBand Switch info on PartnerWorld
• Cisco InfiniBand Switch info on IBM.com

bandwidth and extremely low node-to-node latency. As a result, a BladeCenter cluster with the Infiniband switch solution can, in some cases, deliver performance comparable to a single, high-end, monolithic server—at a fraction of the cost.

Here are some quick facts about this module:

- Scales-out Data Centers by interconnecting blades and chassis together with InfiniBand as the interconnect

- Leverages high bandwidth and low latency characteristics of the InfiniBand standard with Remote Direct Memory Access (RDMA)

- Enables consolidation of LAN and SAN connectivity for an entire data cluster to a centralized location

- Virtualizes and shares I/O and storage across an entire BladeCenter or collection of BladeCenters for cost savings and high availability.

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-generations 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-generations applications and systems

- 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

> **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

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 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 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 Fibre Bridge Announcement Letter
• QLogic InfiniBand Fibre Bridge info on PartnerWorld
• QLogic InfiniBand Fibre Bridge info on IBM.com

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.

5

IntelliStation Product Quick Reference

In this chapter, we explore the IBM IntelliStation Pro products and online resources. These are a set of computer systems designed for use by a single user who needs more power than a traditional personal computer can provide. This includes things like engineering, electronic design, digital content creation, scientific R & D, oil exploration, medical imaging, drug discovery, and more. There are three groups within the IntelliStation family: A Pro, Z Pro, and M Pro. Let's take a look at each.

A Pro

The IntelliStation A Pro (Figure I.1) delivers exceptional performance and reliability with the latest technology additions, including the AMD Opteron 256 (3.0GHz single core) processor and two new graphics cards solutions from NVIDIA - the Quadro FX 4500 X2 and Quadro FX 1500. The extreme Quadro FX 4500 X2 solution is architected with two NVIDIA Quadro FX 4500 graphics processing units (GPUs) and advanced graphics in a single slot solution. The Quadro FX 1500 mid-range graphics solution offers an exceptional price/performance for Professional 3D applications.

Specifications

Processor	Single-core	AMD Opteron Model 250, 252, 254, 256
	Dual-core	AMD Opteron Model 275, 280, 285
Cache	1 MB L2 cache per processor core	
Core logic A	MD-8000 series with HyperTransport Technology	
Memory (std/max)	2, 4, 8 GB/16 GB3 PC3200 ECC DDR SDRAM, 8 slots	
Available graphics	Standard features: PCI Express x16, certified OpenGL drivers, dual-display capable	
	Multi-GPU, Ultra High Performance: NVIDIA Quadro FX 4500 X2	
	Extreme 3D: NVIDIA Quadro FX 4500	
	High Advanced 3D: NVIDIA Quadro FX 3500	
	Advanced 3D: NVIDIA Quadro FX 1500	
	Performance 2D: NVIDIA Quadro NVS 285	
Power supply	530W; 3 temperature-controlled fans	
Internal storage	Up to 1 TB SATA, 1.2 TB Ultra320 SCSI	
Controllers	SATA and dual-channel, 64-bit Ultra320 integrated	
Slots	PCI Express x16, 64-bit/133 MHz PCI-X, 64-bit/100 MHz PCI-X	
Bays (total/open)	(3/2) 3.5" internal, (1/1) 3.5" external, (2/1) 5.25" external	
Ports	5 USB 2; 2 IEEE 1394; 2 serial; 1 parallel	
Operating system (preinstalled)	Microsoft Windows XP Professional x64 Edition or Red Hat Enterprise Linux 4 WS (64-bit), (others supported)	
Supported applications	Visit ibm.com/servers/intellistation/pro/isv/index.html	
Universal Manageability	Visit ibm.com/servers/eserver/xseries/systems_management/director_4.html	
3D pointing device	IBM 3D SpacePilot Input Device (40K9202)	
Rack mounting rack kit	(09N4300), NetBAY Rack (9306420)	

- A Pro 6217 details on PartnerWorld

- A Pro 6217 details on IBM.com

- A Pro 6217 competitive info on COMP

Figure I.1. IBM IntelliStation A Pro 6217 at a glance (and links to more detail).

Both mid-range and extreme graphics solutions combine with A Pro's quality, precision, and performance engineering to help streamline the production process and enable a faster time to market. The A Pro is certified by third parties for industry-leading CAD, geo-seismic, and visualization applications.

Here are some quick A Pro facts:

- Dual-capable AMD OpteronTM 200 Series processors up to 2.8 GHz; dual-core Opteron processor

- Models 275 at 2.2 GHz, Model 280 at 2.4 GHz; Model 285 at 2.6 GHz

- Microsoft Windows XP Professional x64 Edition available preinstalled

- Red Hat Enterprise Linux 4 WS (64-bit) available preinstalled

- Up to 16 GB1 PC3200 ECC memory (8GB per processor, dual-channel) with 128-bit controller

- PCI Express x16 2D/3D graphics from NVIDIA with dual-display support

- Choice of SATA or dual-channel Ultra320 SCSI hard disk drives

- Scalable 6-slot x 6-bay minitower with 530W quiet power supply.

Z Pro

The IntelliStation Z Pro (Figure I.2) sets a faster pace for businesses with familiar 32-bit software while growing into key 64-bit applications, helping to optimize your workflow and

Specifications

Form factor	Tower/5U
Processor	Up to two Dual-Core Intel Xeon Processors up to 3.0 GHz and up to 1333 MHz front-side bus
Cache (max)	Up to 4 MB L2
Core logic	Intel ESB2M chipset; 1333 MHz system bus
Memory (std/max)	4 GB/32 GB DDR II Fully Buffered DIMM 667 MHz via 8 DIMM slots
Available graphics	NVIDIA NVS 285; NVIDIA FX 550; NVIDIA FX 1500; NVIDIA FX 3500; NVIDIA FX 4500
S.M.A.R.T. hard disk drives	SATA: 80 GB/7,200 rpm; up to 250 GB/7,200 rpm (optional) Ulta320 SCSI: 73.4 GB/10,000rpm (15,000 rpm optional); 300 GB/10,000 rpm (optional)
Controllers	Integrated SAS and SATA
Slots (total/open)	5/4: 2x PCI-Express x8 or x16; 2 PCI-X and 1 PCI
Bays (total/open)	6 bays (2/1) 5.25" external, (4/3) 3.5" external
Operating systems supported	Red Hat Enterprise Linux (64-bit), Microsoft Windows XP Professional (32-bit) and XP Pro x64 edition
Supported applications	Visit ibm.com/servers/intellistation/pro/isv/index.html for the list of engineering, electronic design automation, digital media, geophysical and life science applications.
Rack mounting	Rack kit (39Y9707)

- Z Pro details on PartnerWorld

- Z Pro details on IBM.com

- Z Pro competitive info on COMP

Figure I.2. IBM IntelliStation Z Pro at a glance (and links to more detail).

maximize your ROI. It's all about making the choice easy: 32- and 64-bits, Microsoft Windows and Red Hat Linux, 2D and 3D graphics tuned to your applications.

The Z Pro invokes the latest technologies such as single or dual Intel Xeon processors up to 3.8 GHz with full-speed L2 cache up to 2MB, a trio of second-generation PCI Express x16 graphics adapters from ATI, NVIDIA, and 3Dlabs, and fast SATA or faster dual-channel Ultra320 SCSI storage. The Intel E7525 chipset underpins this cauldron of energy, supporting up to 16GB of DDR II memory and an 800 MHz system bus to channel the flood of data. The Z Pro boasts handy front-mounted ports and status lights, tool-free access for upgrades and an available rackmount kit.

Hardware encryption, a new integrated design feature, helps provide data and storage security, and improved noise control helps make effective team collaboration a reality.

Here are some quick Z Pro facts:

- Intel Extended Memory 64 Technology for simultaneous 32-bit and 64-bit application compatibility

- Choice of PCI Express x16 graphics from ATI, NVIDIA, and 3Dlabs approaching twice the bandwidth of AGP 8X

- Choice of dual-channel Ultra320 SCSI or SATA hard disk drives; HostRAID support Level 0, 1 integrated.

M Pro

The IBM IntelliStation M Pro workstation (Figure I.3) delivers a highly available compact workstation designed to fit tight

Specifications

Processor	
Single-core	Intel Pentium 4 (600 series) up to 3.6 GHz
Dual-core	Intel Pentium 4 (900 series) up to 3.6 GHz
Cache	Full-speed L2 cache, 2 MB per processor core
Core logic	Intel 955X chipset; 800 MHz system bus
Memory (maximum)	Up to 8 GB PC-4200 ECC DDR II SDRAM; 4 DIMM slots
Available graphics (all certified OpenGL drivers and dual display capable)	Extreme 3D: NVIDIA Quadro FX 4500; Advanced 3D: NVIDIA Quadro FX 1500; High Advanced: NVIDIA Quadro FX3500; Performance 2D: NVIDIA Quadro NVS 285
Internal storage	Up to 1 TB SATA; Up to 900 GB Ultra320 SCSI: Up to 900 GB SAS
Controllers	ATA/100, SATA integrated; Ultra320 on SCSI-equipped models; Factory-configured SAS models include Razor Light daughter card
Optical storage	Standard: up to 48X/32X/48X/16X CD-RW/DVD-ROM Combo Optional: up to 48X-20X CD-ROM; Multi-Burner Plus DVD-CD RW
Slots	PCI Express x16, PCI Express x4, PCI Express x1, PCI 32-bit/ 33 MHz
Bays (total/open)	3.5" internal (2/1), 3.5" external (1/1), 5.25" external (2/1)
Network interface	Integrated high-bandwidth Gigabit Ethernet
Ports	8 USB 2.0; 2 IEEE 1394; 2 serial; 1 parallel
Audio	AC-97 audio, microphone in, line in/out, headphone jack, integrated speaker
Operating system preinstalled	Microsoft Windows XP Professional (32-bit) or Windows XP Professional x64 Edition; Red Hat Enterprise Linux WS 4 (32-bit)
Supported applications	Visit ibm.com/servers/intellistation/pro/isv/index.html

- M Pro details on PartnerWorld

- M Pro details on IBM.com

- M Pro competitive info on COMP

Figure I.3. IBM IntelliStation M Pro at a glance (and links to more detail).

spaces and tight budgets. With a range of dual-display graphics card solutions from NVIDIA available, you can choose the option that best meets your requirements, whether you're working with basic 2D or highly advanced large-assembly 3D models.

Designed to help optimize the user experience, the IntelliStation M Pro offers a streamlined design with tool-free access to slots and bays and color-coded components. Best of all, the workstation is small enough to fit in tight spaces. Server-like performance and memory protection reduce tedious waiting time. Plus an integrated Trusted Platform Module1 for hardware encryption, with separate purchase of third-party applications, helps increase data and storage security by allowing the right people to have access to the right information.

Here are some quick M Pro 6218 facts:

- Delivers performance and dependability at an affordable price

- Leverages innovative design to help maximize usability and reduce noise

- Offers robust client systems management tools.

About the Author

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 e-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.

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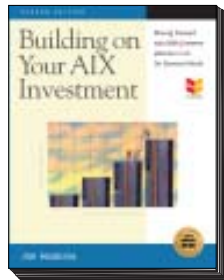by Jim Hoskins
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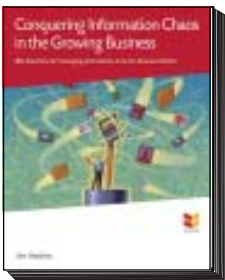by Jim Hoskins
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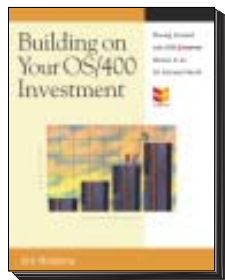
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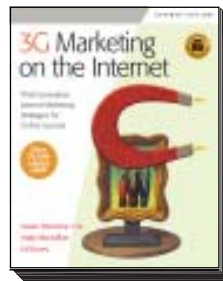and Ray Winkel
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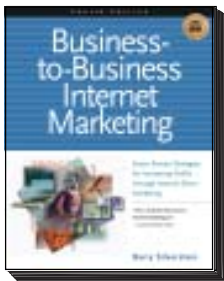by Shannon Kinnard
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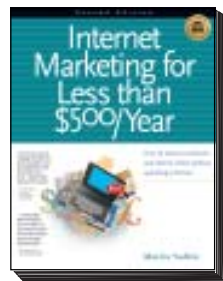by Susan Sweeney, C.A.
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