IBM System x and BladeCenter
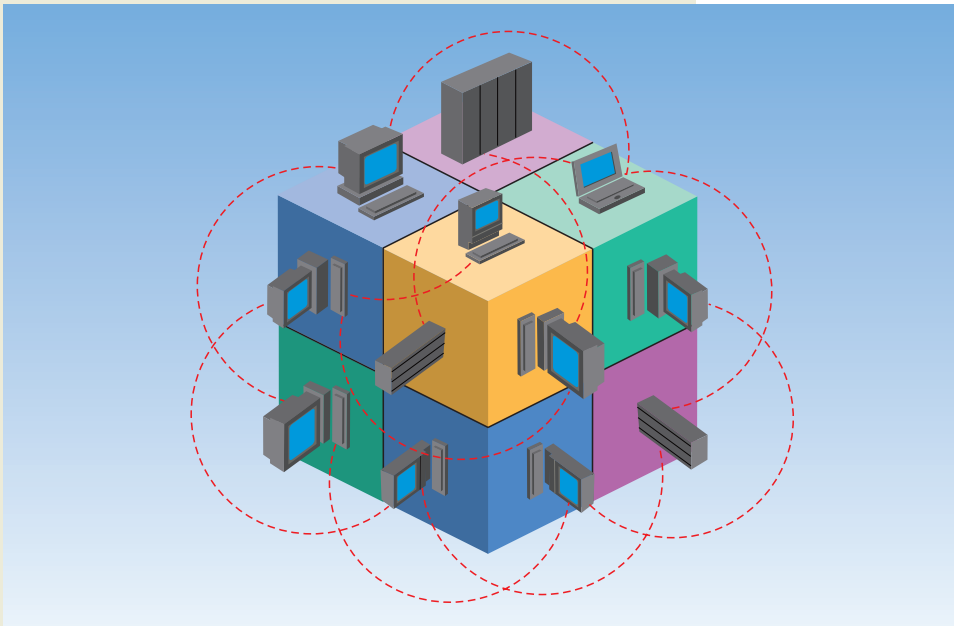
Business Partner Guidebook

Your Roadmap to Success with IBM System x and BladeCenter

Max Facts ™

eBook

Edited by Jim Hoskins

IBM System x and BladeCenter Business Partner Guidebook

Titles of Interest

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IBM System x and BladeCenter Business Partner Guidebook

Twenty-Second Edition

Your Roadmap to Success with IBM System x and BladeCenter

Edited by Jim Hoskins

(version 22.0e)

Clear Horizon

Notices

Acknowledgments

Many people gave assistance in preparation of this guidebook. Some provided information concerning their product area of expertise. Others reviewed the manuscript and provided helpful comments. To all of those who assisted…THANK YOU!!

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What's New in This Edition?

This edition of the guidebook has been updated to include IBM System x and BladeCenter products announced through March 2012.

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

- IBM System x3500 M4

- IBM System x3550 M4

- IBM System x3650 M4

- IBM System x3690 X5

- IBM BladeCenter HS23

- IBM iDataPlex dx360 M4

Your 10-Step Quick Start

Take these 10 steps to "hit the ground running" if you are a new IBM Business Partner.

1. Check for Updated Editions of This eBook

This guidebook has the ability to check for more current editions which are released periodically. Simply click on the "More on the Web" link provided here (or the link on the cover) and this guidebook

More On The Web
• Check for updated editions of this guidebook

will automatically check to see if you have the most current edition. If you don't, you will be able to download the latest edition immediately.

2. Apply for Your IBM PartnerWorld Membership

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

More On The Web
• Explore PartnerWorld
• PartnerWorld contact phone numbers by country
• Get your PartnerWorld user ID

Chat now with IBM tech support

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 Business Partner News

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, and more, hand-picked for business partners.

> **MORE ON THE WEB**
>
> • Get news for IBM Business Partners

4. Enroll in the Systems Connect eXpert Program

Enroll in Systems Connect eXpert to easily locate online education and get the guidance you need to prepare for the System x and BladeCenter certification exams. The eXpert program also offers training on strategic topics that are not part of a specific certification track but are critical to help drive your business forward.

> **MORE ON THE WEB**
>
> • Systems Connect eXpert

Get started by enrolling in four easy steps. Select your education roadmap of choice—sales or technical. Then start progressing through the education.

5. Review the System x Express Portfolio

The IBM midmarket portfolio is a set of IBM products and services (e.g., servers, storage, services, etc.) specially configured and priced for the small and mid-size business environment. Most System x and BladeCenter products are now offered as Express models, which offer more aggressive pricing, faster availability, and ease of installation. Become familiar with

More on the Web
• IBM Express Advantage

IBM's midmarket portfolio of offerings and you will have solutions for your customers that you can deploy quickly and grow as needed.

6. Understand the Express Seller Program

Express Seller is designed to help IBM Business Partners accelerate sales of select IBM products and services to small and mid-size businesses. These offerings are supported by IBM investments in incentive programs, education, and demand generation support to help you generate leads.

More on the Web
• Express Seller Toolkit

7. Learn to Quickly Find IBM Product Information

IBM maintains a search page that allows you to quickly find detailed product information from IBM announcement letters (one of these is released for every product IBM announces), the IBM Sales Manual (a comprehensive collection of de-

tailed 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.

8. 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.

9. Try Out "Know Your IBM"

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

KYI is more general training that will give you a "high-level" view of IBM offerings. The road maps provided by IBM will guide you to more detailed training opportunities.

10. 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 Guidebook

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

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

Products May Vary from Country to Country

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

How to Use This MaxFacts™ Interactive Guidebook

This guidebook has been specially designed to be read on your computer screen using the free Adobe Acrobat Reader

software or a supporting Web browser. Alternately, you can print this guidebook on almost any printer and read the material anywhere.

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

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

When you are finished exploring, just close or minimize the Web browser window and you will arrive back at the guidebook. You are encouraged to explore all links that interest you

to get the most out of this guidebook. You must have an active connection to the Internet to use the embedded links.

To navigate around within this guidebook, you can:

- Step forward or backward a page at a time using the standard Acrobat Reader navigation toolbar shown along the bottom of your screen

- Click on the "Bookmark" links shown on the left side of your screen to go directly to that part of the guidebook

- Click on the "Table of Contents" section and click on the links to go directly to that part of the guidebook

- Search for keywords in the document using the Acrobat Reader "Find" function (found on the toolbar).

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To see our full line of IBM titles, we invite you to visit our Web site, maxpress.com. From all of us at Maximum Press, thank you for your interest.

MORE ON THE WEB
• Maximum Press Web site

1

Welcome to the Team

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

Why Team with IBM?

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

Innovation That Matters

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

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

blending in ways that will result in productivity breakthroughs greater than the sum of their parts. Teaming with IBM will allow you to provide the insight, solutions, and innovation that matter to help your customers succeed.

> **MORE ON THE WEB**
>
> • About IBM's patent portfolio

A Smarter Planet

By *smarter*, we mean that intelligence is being infused into the systems and processes that make the world work—into things no one would recognize as computers: cars, appliances, roadways, power grids, even clothes. We find ourselves in a world becoming smaller, flatter, and smarter.

> **MORE ON THE WEB**
>
> • A Smarter Planet info on IBM.com

Data is being captured today as never before. It's revealing everything from large and systemic patterns—of global markets, workflows, national infrastructures, and natural systems—to the location, temperature, security, and condition of every item in a global supply chain. And then there's the growing torrent of information from billions of individuals using social media. They are customers, citizens, students, and patients. They are telling us what they think, what they like and want, and what they're witnessing. As important, all this data is far more real-time than ever before.

Smarter Computing

IBM's approach to these new challenges is what we call Smarter Computing and it's delivered through a combination of design-

ing for data, tuning to the task, and enabling cloud technologies. These are the characteristics of a Smarter Computing infrastructure. And the key point is that this is an IT infrastructure that enables a Smarter Planet. As clients want to seize the opportunities that are presented by a Smarter Planet, they need to think differently about their infrastructure (Figure 1.1).

Why IBM System x and BladeCenter?

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

Realize Innovation

Combining open, industry standards with our deep business experience and renowned research capabilities, System x and

A holistic system

Smarter computing is realized through an IT infrastructure that is designed for data, tuned to the task, and managed as a cloud.
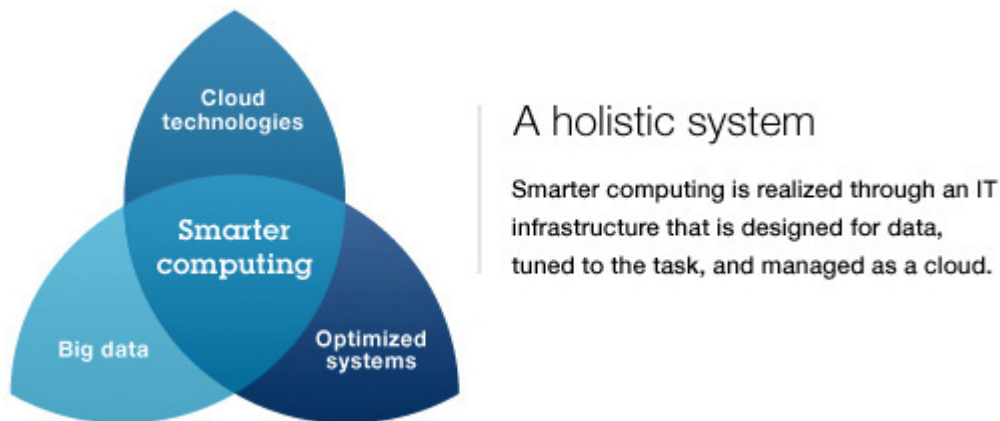
Figure 1.1.   A holistic approach to Smarter Computing.

BladeCenter servers include innovative technology that boosts performance, adds flexibility, and makes IT easier and more reliable; proactive tools that help clients manage complexity and support growth of clients' businesses and data centers; and capabilities that help business become more efficient so clients can go green and start saving and realize ROI. The ultimate goal is to help clients realize innovation in their own business. Imagine enterprise servers, blade servers, rack servers, and solutions that are open, easy, and green with innovation that can help set your clients apart from their competition.

IBM eX5 Servers

Over the years, IBM has continued to evolve the scope of X-Architecture to support the demanding enterprise-class workloads that clients increasingly deploy on x86 systems. Today, IBM continues its tradition of x86 leadership with unique capabilities for breaking through IT bottlenecks with balanced systems design—focusing on three major engineering goals:

- Unleashing memory

- Delivering unmatched I/O performance

- Providing flexible systems for affordable scalability and simplified deployment.

The IBM System x eX5 servers are designed for a business's most demanding workloads. eX5 systems are the ideal platform for today's business-critical applications—like database processing, customer relationship management, and

enterprise resource planning—and highly consolidated, virtual server environments. With multiple workloads running on the same server, performance remains important; but reliability and availability become more critical than ever. IBM System x enterprise servers are built with eX5 innovations, which include the MAX5 memory expansion and other advanced capabilities that give you higher throughput, exceptional reliability, and the ideal platform for virtualization, database, and enterprise workloads.

IBM System x Rack and Tower Servers

IBM delivers next-generation technology today that the competition can't match. Some server vendors view uni- and two-socket servers as commodities, using off-the-shelf components to produce cookie-cutter servers with no added value. IBM X-Architecture system design, on the other hand, begins with standard parts and adds innovation like eXFlash high IOPS SSD technology and 10GbE Virtual Fabric to create something more practical: outstanding performance, high availability, scalability, power efficiency, and proactive manageability.

IBM BladeCenter Blade Servers

IBM BladeCenter is helping companies in every industry sweep complexity aside. The blades contain all the necessities to run an application—processors, memory, I/O, and storage. The chassis contains shared redundant power, shared hot-swap cooling, DVD, integrated Ethernet, storage, switching,

and consolidated powerful management. Its innovative, open design offers a true alternative to today's sprawling racks and overheated server rooms. So toss your cables. You have nothing to lose but complexity.

IBM System x iDataPlex Servers

Designed for data centers that require high performance, yet are constrained on floor space, power, and cooling infrastructure, the IBM System x iDataPlex provides an innovative solution optimized for maximum density and incredible efficiency.

The energy-efficient design of the iDataPlex servers and chassis can reduce the incoming energy requirement by up to 40% vs. standard 1U servers. Reduce your energy costs even further with an optional liquid-cooled IBM Rear Door Heat eXchanger for iDataPlex, which allows the solution to run at "room temperature." iDataplex provides customers a single point of support for an integrated and energy efficient solution to easily roll out in their data center. Customer case studies show savings of up to 40 percent on energy costs and four times the processing power compared to the solution replaced by iDataPlex.

Reduce Sprawling IT

One of the challenges facing today's businesses is IT sprawl. We've seen server volumes grow by 6 fold and storage by almost 70 fold over the last two decades. What you're seeing are IT departments that have to make investments which lead to more sprawl, which drives up costs. It's a challenge that needs to be addressed and requires not just incremental

improvements in savings or cost reductions, but dramatic improvements in total cost of ownership as well. These improvements are brought about by leveraging energy efficiency, virtualization, and consolidation with optimized systems and networks across all resources in the data center, alternative service delivery models, and standardization. With IBM System x and BladeCenter, organizations can help simplify the management of the IT infrastructure, improve utilization, and reduce costs.

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

Inflexible IT

Over time, as new infrastructure is added, IT resources can become cumbersome and inflexible. As IT departments are asked to deploy new services, they can't work across all the different silos of IT to quickly deliver these new services. Given the dynamic nature of today's demands, a business needs to be supported by an IT infrastructure that can adapt to changing needs. IBM System x and BladeCenter provide organizations the flexibility they need to proactively adjust to change and get the most out of their existing assets.

The IBM X-architecture blueprint equips System x and BladeCenter servers with innovative technology that makes IT easier and more reliable. IBM servers come standard with proactive tools that help customers manage complexity and support growth of their business and data center. Add innovation and you have best-of-breed System x and BladeCen-

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

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

IT Resiliency

The complexity and growth of today's data center has also exacerbated the need for resiliency. Systems must be able to identify issues before they happen, react to avoid disruption, and if failure occurs, recover quickly. As a result, resiliency must evolve from the physical hardware to the workload. Proactive, secure integrated tools provided by System x and BladeCenter—for tracking and deploying assets, optimizing performance, and even enabling remote maintenance—provide a single, consistent interface so customers can more securely manage their IT. An intelligent system design that includes multiple layers of redundancy and memory protection, combined with advanced availability tools, provides the kind of critical resiliency customers need. The ultimate goal is to help customers realize innovation in their business. Imagine enterprise servers, blade servers, rack servers, and solutions that include risk-mitigation innovations that help set them apart from the competition.

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

IBM System x Rack and Tower Server Basics

Your clients are facing rising power and cooling costs, their IT infrastructure lacks reliability and flexibility, their IT is inadequate for current business needs, and their data center administration is complex and expensive. IBM System x helps clients address these challenges and take back control by simplifying systems for industry-standard computing environments. System x servers provide innovative technology features focused on high performance, quality, and ease of use. With outstanding value, System x servers showcase the best of IBM engineering.

IBM BladeCenter Server Basics

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

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

You need enterprise-class reliability to keep your business up and running. IBM BladeCenter is designed with extensive redundancy to reduce failures. Add tools that can help you quickly diagnosis a problem such as IBM predictive failure analysis and light path diagnostics to help preserve application uptime.

Virtualizing on System x and BladeCenter

Utilization and efficiency can be increased by consolidating and virtualizing server workloads and applications. Your customers can simplify virtual-server deployments—especially when application requirements are growing or unpredictable—using System x enterprise servers with extra processor, memory, and I/O capacity that the competition can't match. If power consumption is your primary concern, consolidate onto BladeCenter servers and virtualize applications to better utilize resources and amplify the already-significant advantages of BladeCenter efficiencies.

> **MORE ON THE WEB**
> - Blade Open Specification

Virtualizing with BladeCenter also allows customers to choose from a broad range of reliable networking and storage with BladeCenter Open Fabric. When it comes to business-critical applications, IBM System x and BladeCenter offer the performance, availability, and resiliency your customers need. If your need for virtual machines continues to grow in an accelerated number and the cost of power or hardware begins to add up, iDataPlex can also be a viable virtualization platform that will save the cost of hardware redundancy for virtualized applications that are parallel and non-mission-critical.

Save with IBM Energy Efficiency

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

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

Systems Management Made Easy

Because of the enterprise-level technology standard in IBM System x and BladeCenter servers, customers sometimes worry how to bring these servers into their IT infrastructure in a seamless fashion. Enter Systems Director. IBM servers come with a comprehensive management software portfolio which allows the servers to be managed either locally or remotely. Systems Director offers comprehensive management of both the physical and virtual system, allows for an automated, fast deployment, provides a single interface for the entire data center, and seamlessly plugs into many existing enterprise management solutions such as Tivoli and other non-IBM solutions. Products like Systems Director VMControl help you move beyond managing virtualization to using virtualization to better manage your IT infrastructure, and products like IBM Systems Director Network Control provide integration of server, storage, and network management for virtualization environments across multiple platforms. With additional tools like Active Energy Manager and BladeCenter Open Fabric Manager, System x and BladeCenter reduce the complexity of managing your data center.

What Are IBM Express Offerings?

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

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

2

General System x and BladeCenter Resources

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

The IBM PartnerWorld Web Site

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

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

In this guidebook, we have summarized and provided direct links to a great deal of Partner-World information of interest to System x and BladeCenter Business

Partners. As such, this guidebook 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.

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.)

System x Specialty/Solution Specialty Advisor

The IBM PartnerWorld System x Specialty offers unique benefits to our business partners. The IBM PartnerWorld System x Specialty rewards a business partner for the investment in sales and technical skills and the market performance they achieve in System x technology and solutions. Certification, as an industry-recognized validation of skills, is a proven differentiator in the marketplace. Within the growing opportunity in the x86 market, this differentiation can help a business partner stand out from the competition.

The criteria for the System x Specialty is available immediately and business partners are encouraged to begin prepar-

ing to meet these criteria and apply now.

IBM has enhanced the Solution Specialty Advisor to help you track your progress with System x Specialty. This Web-based application will offer you guidance on the processes needed to become a System x Specialty partner.

Solution Specialty Advisor helps you:

- See why you should participate in the System x Specialty via a Flash file

- Understand the steps to becoming a System x Specialty Business Partner

- See where your firm stands in meeting the certification requirements through the Partner Profiling System (PPS).

> **MORE ON THE WEB**
>
> - System x Specialty info on PartnerWorld
> - IBM Solution Specialty Advisor

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 section, we discuss options for you to obtain the System x–related education you need.

IBM Systems College

The IBM Systems College is your one-stop education resource for all STG brands including System z, Power, Storage, System x, BladeCenter, and Retail Store Solutions. Find the most current education as well as road maps, certification infor-

mation, tools, resources, and much more by platform or job role. With hundreds of on demand learning opportunities, there is sure to be something you can use to help you be successful today and over the

MORE ON THE WEB

- IBM Systems College
- System x Sales
- System x Technical

long term. The IBM Systems College also provides information on IBM skills mastery, mastery tests, and certifications.

Systems Connect eXpert Education Offering

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

Systems Connect eXpert tracks your education achievements as you progress through the education road maps. Additionally, take advantage of the education modules delivered through the sales and technical pools to obtain additional training on strategic topics that are not part of a specific certification track but are critical to help drive your business forward.

Get started by enrolling in four easy steps. Select your education road map of choice—sales or technical. Then, start progressing through the education.

MORE ON THE WEB

- Systems Connect eXpert Program

Systems Connect eXpert is also the exclusive home of the IBM Techline Data Repository, the same library that the IBM Techline team uses to research System x product requirements.

IBM Professional Certifications

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

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

> **MORE ON THE WEB**
>
> • IBM Professional Certification info

Here are the basic steps in the certification process:

1. Select the certification you would like to pursue.

2. Determine which tests are required by reading the certification role description.

3. Prepare for the test. A great way to prepare for your System x Sales and Technical Certifications is by enrolling in the Sys-

tems Connect eXpert offering described above. Or, attend an IBM conference event where classroom training opportunities are offered.

4. Register to take a test by contacting one of our worldwide testing vendors.

5. Take the test.

6. Repeat steps 3 through 5 until all required tests are successfully completed for the desired certification role.

The System x and BladeCenter Specialist Certification Guide (see the link in the "More on the Web" box) provides more information about the IBM certification process. Earn an industry-recognized IBM certification.

Other 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 training listed on PartnerWorld
- BladeCenter training listed on PartnerWorld
- PartnerWorld University

Know Your IBM (KYI)

Know Your IBM is a permission-based interactive marketing and selling resource designed for you, our Business Partner

sellers. It provides net, customized, online education modules focusing on strategic product and solution areas. The education helps increase your 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 encourage you to complete the education modules and provide you rewards for your sales performance. Incentives are awarded at the individual rep level, not to the firm.

Social Media Resources for IBM Business Partners

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

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

> **MORE ON THE WEB**
>
> - System x performance benchmarks
> - BladeCenter performance benchmarks

can find detailed information on benchmark testing and the latest benchmark testing results for System x and BladeCenter by following the links in the "More on the Web" box.

Success Stories, References, Case Studies

It is often helpful to make prospective customers aware of other businesses that have successfully implemented solutions based on System x and BladeCenter. For this reason, IBM maintains a database of existing customer success stories, complete with company profiles, identified needs, solu-

> **MORE ON THE WEB**
>
> - System x and BladeCenter success stories
> - Become a success story

Play video

Customer testimonials (multiple videos)

tions, 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.

Additionally, we invite you to bring nominations of clients you have helped be successful by leveraging IBM System x and BladeCenter. We would like the opportunity to create a case study or success story video with you and your client. To learn about this program, visit the link in the "More on the Web" box.

Sources for Competitive Marketing Information

IBM maintains a Web site called "Comp" which is a worldwide portal for information that will help you win in competitive marketing situations. It includes a searchable set of reports, presentations, and quick reference cards about the marketplace, competi-

> **MORE ON THE WEB**
>
> - IBM "Comp" Web site
> - IBM System x competitive sales tool

tors, and competitive products. You will find materials developed by IBM as well as outside sources such as Gartner, IDC, DH Brown, and IDEAS International.

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

Playbook/Sales Kits for System x and BladeCenter

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

MORE ON THE WEB
• Playbook for System x and BladeCenter

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

Web Content Syndication (for Your Web site)

IBM Business Partners who market and sell IBM servers, storage, workstations, services, and software can improve their Web presence for FREE by leveraging syndicated Web content from ibm.com to their own Web sites. IBM has teamed with WebCollage, Inc.,

MORE ON THE WEB
• Web content syndication

to provide the capability for Premier, Advanced, and Member level PartnerWorld participants to receive Web content dynamically delivered into their Web sites.

Pre Sales Information at Your Fingertips (PSAT)

IBM Business Partners needing access to pre-sales information for IBM System x Servers and IBM Bladecenter can find quick access to IBM information using the Pre-Sales Advisor Tool (PSAT). Access supply availability, promotions, COG,

competitive informa-tion and access to our online configu-rator or link to the download configurator SSCT.

> **MORE ON THE WEB**
>
> • [Pre-Sales Advisor Tool (configs, tools, resources)](#)

Configuration Tools for Specifying Servers

IBM has created several tools to help you configure specific server solutions as necessary to get pricing and place an or-der. There are tools (wizards, PDF files, spreadsheets, etc.) that help you config-ure System x servers, BladeCenter serv-ers, racks of servers, and even cluster solutions. You can explore these tools by following the link provided in the "More on the Web" box.

> **MORE ON THE WEB**
>
> • [Configuration tools](#)

System x and BladeCenter Workload Solutions eGuide for BPs

The Workload Solutions eGuide for BPs is a repository that provides sales assets for mission-critical customer solutions in a simple, easy-to-use package.

> **MORE ON THE WEB**
>
> • [System x and BladeCenter Workload Solutions eGuide for BPs](#)

Attaching Accessories and Upgrades to Your Proposals

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

devices, racks, power solutions, net-
working devices, monitors, and input
devices. Don't forget to include op-
tions that improve the value of the
solution you are proposing to your
customers. You will find a compre-

> **MORE ON THE WEB**
>
> - System x accessories
> - Tape storage
> - Rack, stack & power

hensive listing of these options by following the links in the
"More on the Web" box.

Attaching Operating Systems to Your Proposals

All IBM System x and BladeCenter servers need an operat-
ing system, so it makes sense that you should discuss with
your customers what OS is going
to be deployed on the hardware.
You can now deliver a more con-
venient and complete solution for

> **MORE ON THE WEB**
>
> - System x operating systems

your customers by including the operating system on new
hardware. Operating systems from Microsoft, SUSE, Red Hat,
and VMware are available from IBM on a server. You can con-
sult the configurator tools (see above) for a comprehensive
list of which operating systems are available with each server.
You will find a comprehensive list of operating systems within
the software accessories by following the link in the "More on
the Web" box.

Attaching Storage to Your Proposals

Whenever you are proposing the sale of a System x or Blade-
Center 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 serv-ers with storage devices. Properly clothing a server al-lows you to offer a complete solution

while also increasing your profits. IBM's line of storage de-vices falls under the System Storage brand and includes disk storage, tape storage, and storage management software.

The IBM System Storage DS3000 series product family re-places the IBM TotalStorage DS300 and DS400 disk systems. The award-winning DS3000 family of entry storage products is S.A.F.E.R—Scalable, Affordable, Flexible, Easy, and Reliable. It is scalable because you can grow to over 14 TB of capacity. It is affordable because it is an excellent value starting at just under $4,500 USD. It is flexible because the DS3000 series attaches to System x, BladeCenter, and select third-party servers, making it perfect for a mixed-vendor environment. It is easy because the DS3000 Storage Manager (included at no charge) makes deployment and installation simple. It is reli-able 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 stor-age systems. The DS3000 series offers both direct-attach and SAN-attach models.

The IBM System Storage DS4000 series mid-range storage systems offer affordability, flexibility, and high-performance. The DS4000 models are designed to deliver high-bandwidth

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

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

- IBM System Storage with System x or BladeCenter servers can provide integrated storage solutions with a broad range of operating system support to deliver exceptional price, performance, and availability.

- Server consolidation storage networking options enable tape library and disk sharing to support lower TCO by spreading the cost of the library and storage arrays across multiple servers.

- There are "IBM Express" models of System Storage products that provide System x solutions specially configured and priced for the small and mid-size business environment. (See "What Are 'IBM Express' Offerings?" in Chapter 1.)

Attaching Services to Your Proposal

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

CIOs, IT directors, and business leaders in client organizations of all sizes across all industries see tremendous value

in IBM Global Technology Services. Our offerings can provide powerful supplements to their internal resources, opportunities to save money, and programs to enhance the effectiveness of their technology investments. And IBM gives you a way to complement your resources and capabilities. The result is that IBM Global Technology Services can help increase your client satisfaction because you can offer a more complete solution.

> **MORE ON THE WEB**
>
> • Service offering info on PartnerWorld

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

System x Solutions

Whether your business requires a "quick start" solution or you do your own integration, IBM System x and BladeCenter systems provide highly reliable and flexible platforms that can scale quickly, easily, and inexpensively so you can stretch your IT budget and confidently execute your business objectives—even as conditions change.

> **MORE ON THE WEB**
>
> • System x solutions

To gain further insight into these solutions, this section will look at a few examples.

Starter Kit for Cloud x86 Edition

IBM Starter Kit for Cloud x86 Edition is an entry-level software offering that takes your virtualized environment from "cloud-ready" to "cloud." Users can request and provision an environment quickly through an easy-to-use Web-based interface. IT managers can monitor and manage this environment for improved efficiency and utilization of the data center. IBM Starter Kit for Cloud x86 Edition works with the IBM BladeCenter Foundation for Cloud virtualization platform in addition to select IBM System x and BladeCenter servers.

MORE ON THE WEB
• Starter Kit for Cloud details on PartnerWorld
• Starter Kit for Cloud details on IBM.com
• Starter Kit for Cloud competitive info on COMP
• Starter Kit for Cloud blog search
• Starter Kit for Cloud Twitter search

Here are some quick Starter Kit for Cloud facts:

- Cloud software stack delivers fast time to value

- Simple-to-deploy, easy-to-use, works with existing infrastructure

- Easily integrates with BladeCenter Foundation for Cloud

- Optimizes the data center with increased automation, structured security, comprehensive management, and resource sharing

- Scales to improve quality and meet demand for continuous availability

- Offers metering tools to develop usage and billing models to track ROI.

CloudBurst for System x

IBM CloudBurst (Figure S.1) provides a preintegrated and preloaded system with software, servers, storage, networking, and QuickStart services to help you take the guess work out of establishing a private cloud computing environment. CloudBurst can help you get up and running in days, not months. CloudBurst is built on the IBM System x platform, bringing the advantages of the latest IBM BladeCenter capabilities to the cloud environment.

- CloudBurst on System x details on PartnerWorld
- CloudBurst details on IBM.com
- CloudBurst on System x competitive info on COMP
- CloudBurst on System x blog search
- CloudBurst on System x Twitter search

Figure S.1.   IBM CloudBurst on System x (and links to more detail).

IBM CloudBurst helps address the high cost of administration by providing a self-service portal, service catalog, and prepackaged automation templates. With the Web-based 2.0 self-service portal, users can request the services they need when they need them, for the duration they need them, eliminating manual processes for requesting resources. The service catalog provides a single repository for pre-engineered cloud services, enabling consistency of service delivery across the enterprise. The prepackaged automation templates facilitate fast, automatic provisioning of the required user environment, helping eliminate manual work and keeping skilled employees focused on key projects. This integrated cloud service delivery system allows management of both physical and virtual workloads through a single interface to servers, storage, and networking resources, assuring fast provisioning, de-provisioning and remediation of issues. Resources can be provisioned in minutes versus weeks in a consistent manner. A new multi-tenancy feature provides the ability to offer secure, segregated cloud services to multiple different users, helping to maximize utilization of resources.

Here are some quick CloudBurst facts:

- Preintegrated service delivery infrastructure accelerates deployment of private cloud

- Sophisticated self-service portal, service catalog, and automated workflows to save operating costs

- High-performance and resilient architecture maximize virtualization efficiency and return on investment

- Automated management and superior reliability minimize complexity, lower risk and maintenance costs

- Designed to scale easily to match resources to changing business needs and adapt to new requirements.

BladeCenter Foundation for Cloud

Reduce complexity and risk with IBM BladeCenter Foundation for Cloud (Figure S.2). It provides the flexibility and ease of use needed with preintegrated systems and a preloaded management system. Comprehensively designed with everything needed to deploy a high performance, reliable, and scalable fully virtualized data center, it comes with converged networking, virtualized servers, storage, and available start-up services to help you take the guesswork out of establishing a virtualized data center environment. BladeCenter Foundation for Cloud can help you get up and running in days, not weeks. This solution is built by combining the strength of the IBM System x platform and the advantages of the latest BladeCenter capabilities in the virtualized environment—including great performance, unmatched reliability, rapid scaling, high resiliency, and leading network bandwidth capacity as well as industry-leading virtualization technology from VMware. BladeCenter Foundation for Cloud is available in multiple configuration sizes to meet your organization's specific needs.

- BladeCenter Foundation for Cloud details on PartnerWorld
- BladeCenter Foundation for Cloud details on IBM.com
- BladeCenter Foundation for Cloud competitive info on COMP
- BladeCenter Foundation for Cloud blog search
- BladeCenter Foundation for Cloud Twitter search

Figure S.2.   IBM BladeCenter Foundation for Cloud (and links to more detail).

Here are some quick BladeCenter Foundation for Cloud facts:

- Comprehensive virtualization platform with converged networking, servers, storage, and management

- High return on investment platform, large virtual machine capacity in a simple-to-manage package

- Fast and easy to order and deploy with tested configurations

- Reduce complexity and risk with best practices high availability designed in

- Energizes new performance and technology into existing data centers and opens easy pathway to cloud.

Integrated Virtualization with VMware ESXi

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

> **MORE ON THE WEB**
>
> - IBM solutions for VMware ESXi

VMware ESXi 3.5 is an operating system-independent, thin hypervisor designed for rock-solid reliability, simplified management, and enhanced security. For more advanced capabilities, VMware ESXi 3.5 may be upgraded to VMware Infrastructure 3 Foundation, Standard, or Enterprise edition licenses. IBM offers System x and BladeCenter servers pretested and integrated with VMware ESXi 3.5, allowing you to deploy and manage virtual machines quickly and easily with robust platforms built for reliable virtualization.

SAP Solutions for Small and Mid-size Businesses

SAP offers a complete range of enterprise software applications and business solutions to drive businesses ranging from enterprise to small. It offers these business applications and solutions to handle every aspect of the business. The Windows and Linux markets are important to SAP and IBM System x/BladeCenter is an ideal platform for SAP applications offering leading performance, reliability, and scalabilty for these critical business applications.

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

SAP Business One is an easy-to-use business and operational management solution for emerging and dynamic businesses ranging in size from ten to several hundred employees. The solution is simple yet powerful, allowing an immediate and complete view of both business operations and

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MORE ON THE WEB

- SAP applications for System x and BladeCenter info on IBM.com
- SAP on System x info on PartnerWorld
- The benefits of running SAP solutions on System x and BladeCenter Redbook
- SAP solutions for SMB info on SAP.com
- IBM and SAP Alliance

customer activities. If your company is located in the United States, please visit the new SAP Business One collaboration site to discover a new and different way to work with SAP Business Partners.

SAP Business All-in-One is a prepackaged, industry-specific version of SAP Business Suite with built-in content, tools, and methodologies for a cost-effective, turnkey implementation. SAP Business All-in-One solutions offer out-of-the-box flexibility combined with the power of SAP's world-class business solutions.

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

IBM Global Financing

IBM Global Financing (IGF) continues to focus on meeting customer needs by concentrating on key business areas: leasing and lending, remarketing and refurbishing, and asset management. IGF conducts business in more than 40 countries, financing IBM and non-IBM hardware, software, and services, with a full

MORE ON THE WEB
• IBM Global Financing

range of flexible, low-rate offerings. IGF's customers find that financing their information technology solutions offers many advantages in both robust and difficult economic climates because financing frees up their capital for other investments. Many information technology installations, including those

for customer relationship management, data mining, and e-business, require a substantial investment. IGF financing enables customers to pay for their new technology in affordable monthly payments during the life of the project.

Our customers run the gamut from the smallest, family-owned business purchasing a single server and software to the largest, multinational corporation, acquiring tens of thousands of PCs for offices on several continents. In addition to working directly with customers, we work with IBM Business Partners to provide financing for their clients and to help them build their own businesses.

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

Tower Servers

In this section, we look at the specific IBM System x models that use traditional (and some not-so-traditional) "tower" mechanical packaging. This packaging offers flexibility by providing internal expansion capa-

> **MORE ON THE WEB**
>
> • Overview of all System x "tower" servers

bility. 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.

x3100 M4

With support for next-generation Intel Xeon and Core i3 processor technology, the IBM System x3100 M4 (Figure T.1)

Chat now with IBM tech support

Specifications

Processor (max)	Intel Xeon E3-1200 series (quad-core) up to 3.5 GHz/8 MB/1333 MHz, Intel Core i3 2100series (dual-core) up to 3.3 GHz/3 MB/1333MHz, Pentium (dual-core) up to 3.0 GHz/3MB/1333 MHz and low-cost Celeron
Number of processors (std/max)	1/1
Cache (max)	8 MB (processor and model dependent)
Memory (max)	1 ×2 or 1 ×4 GB standard, maximum 32 GB1333 MHz DDR-3 UDIMMs via 4 DIMM slots
Expansion slots	4 PCIe Gen 2 slots (x16, x8, x4, x1)
Disk bays (total/hot-swap)	4 Serial ATA (SATA)
Maximum internal storage	12 TB SATA
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	350 W fixed or 80-PLUS® certified 300 W fixed (model dependent)
RAID support	ServeRAID-C100 for System x supports integrated RAID-0, -1; supports hardware RAID-0, -1, -5 for advanced data protection
Systems management	IMM2
Operating systems supported	Microsoft Windows Server 2008 R2/Microsoft Windows Server 2008, Red Hat Linux, SUSE Linux
Limited warranty	1-year customer replaceable unit and on-site limited warranty

- x3100 M4 details on PartnerWorld
- x3100 M4 details on IBM.com
- x3100 M4 competitive info on COMP
- x3100 M4 configuration details
- x3100 M4 options
- x3100 M4 blog search
- x3100 M4 Twitter search
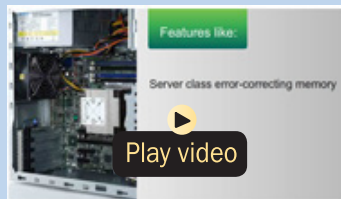
x3100 M3 animated demo

Figure T.1. IBM System x3100 M3 at a glance (and links to more detail).

delivers strong performance for the price in a single-socket tower. Advanced features and functions, which come standard, include innovative integrated RAID capability, dependable server-class memory, energy efficiency, low-cost tower-to-rack kit, and high-capacity storage options for enhanced availability.

Extremely compact, the x3100 M4 fits easily in small spaces. Flexible, configure-to-order capabilities can provide the capacity and features you need, with multiple upgrade options to help meet future growth.

Tested and certified by IBM, the x3100 M4 delivers leadership dependability and systems management. The optional advanced RAID helps protect your data, while dual-networking adapters offer greater network bandwidth and redundancy. A full set of powerful integrated systems management tools makes the x3100 M4 easy to install and service.

Select configurations of the x3100 M4 are part of the IBM Express Advantage Portfolio designed to meet the needs of small and mid-size businesses. Easy to manage, Express models and configurations vary by country.

Here are some quick x3100 M4 facts:

- Delivers robust performance at a competitive entry-server price

- Offers flexibility in an optimized compact design

- Combines reliability and simple installation with innovative management technology.

x3200 M3

The IBM System x3200 M3 (<u>Figure T.2</u>) offers enhanced performance to help you take on the dynamic challenges of running IT with an emphasis on security, simplicity, efficiency, and reliability—delivered at the right price in a single-socket tower server.

The x3200 M3 supports the latest Intel Xeon quad-core and Celeron, Pentium, and Core i3 dual-core processors for exceptional performance. Because your organization must manage growing volumes of data while maintaining high performance, the x3200 M3 offers vast memory capacity and disk storage.

To enable energy savings, the x3200 M3 provides high-efficiency power supplies (model dependent) and support for IBM Systems Director Active Energy Manager, an energy usage monitoring tool.

Managing your IT environment and addressing security concerns don't have to be difficult, resource-intensive tasks. The x3200 M3 offers enhanced manageability and security to help you streamline processes with features such as the Integrated Management Module (IMM) and Trusted Platform Module (TPM) 1.2.

Select configurations of the x3200 M3 are part of the IBM Express Advantage Portfolio, designed and priced to meet the needs of mid-size businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick x3200 M3 facts:

- Boost productivity with new high-performance capabilities, vast memory and expanded storage capacity.

Specifications

Processor (CPU GHz/L2 cache/front-side bus max)	Intel Xeon 3400 Series (quad-core) up to 2.93 GHz/8 MB/1333 MHz or Intel Celeron, Pentium, or Core i3 (dual-core) up to 3.06 GHz/4 MB/1333 MH
Number of processors (std/max)	1/1
Memory (max)	Up to 32 GB DDR-3 1066/1333 MHz ECC memory, 1, 2, and 4 GB UDIMMs; 1, 2, 4, and 8 GB RDIMMs
Expansion slots	Two PCIe x8 Gen2, one PCIe x4, two PCI (32-bit/33 MHz), one dedicated PCIe x4 for RAID-0, -1 controller
Disk bays (total/hot-swap)	Four 3.5" simple-swap or hot-swap SATA hard disk drives (HDDs); eight 2.5" hot-swap SAS HDDs (special bid only)
Maximum internal storage	Up to 12.0 TB SAS or SATA HDDs
Network interface	Dual Gigabit Ethernet
Hot-swap components	Four 3.5" SATA/SAS HDDs, eight 2.5" SAS HDDs
RAID support	Hot-swap hardware RAID-0, -1 (standard), simple-swap hardware RAID-0, -1 (optional); upgrade to RAID-5 optional
Ports	Seven USB (2 front/4 rear/1 internal), two Ethernet, one serial and video
Systems management	Integrated Management Module with IPMI 2.0 and Serial over LAN, IBM Systems Director, IBM ServerGuide, optional Virtual Media Key for remote presence, Trusted Platform Module 1.2
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware ESX/ESXi
Limited warranty	1- or 3-year customer replaceable unit/on-site

- x3200 M3 details on PartnerWorld

- x3200 M3 details on IBM.com

- x3200 M3 competitive info on COMP

- x3200 M3 configuration details

- x3200 M3 options

- x3200 M3 blog search

- x3200 M3 Twitter search

x3200 M3 animated demo

Figure T.2.   IBM System x3200 M3 at a glance (and links to more detail).

- Save on energy costs with integrated power-management tools.

- Improve manageability and security with powerful built-in features.

x3400 M3

The IBM System x3400 M3 (Figure T.3), with the latest Intel Xeon processors, offers flexibility, reliability, and security, as well as enhanced systems management features that make it an ideal choice for small, mid-size, and distributed business-es. This two-socket server provides a balance of performance, high availability, expansion capability, and ease of manage-ment in a stable, long-life platform. The x3400 M3 includes features designed to achieve affordable performance on a tower server, allowing you to replace your older systems as business grows.

The x3400 M3 offers flexible configuration options to help you scale easily as business grows. Higher storage capacity as well as choice in storage interface lets you transform your business as you require. Select the right combination of hard disk drive size, processor and memory capacity for today, and easily incorporate more tomorrow.

Now with low-voltage memory built into its already ef-ficient design—as well as tools for managing energy com-ponents—the x3400 M3 helps you better manage power consumption and costs. Extensive systems management ca-pabilities are also available right out of the box to help save time and money on administration.

Specifications

Form factor/height	Tower/5U (rack-mountable)
Processor (max)	Four-core Intel Xeon E5620 2.40 GHz with 12 MB of cache per processor socket standard or six-core Intel Xeon X5675 3.06 GHz with 12 MB of cache per processor socket (configure to order only)
Number of processors (std/max)	1/2
Cache (max)	4 MB, 8 MB, or 12 MB per processor socket
Memory (max)	16 DIMM slots maximum, 128 GB with DDR-3 1333 MHz RDIMMs or 48 GB with DDR-3 1333 MHz UDIMMs
Expansion slots	Five PCIe and one PCI standard; additional two PCI-X or one PCIe (configure to order only)
Disk bays (total)	Standard with four 3.5" simple-swap Serial ATA (SATA) or four 3.5" hot-swap SATA/Serial Attached SCSI (SAS) HDDs or 8 or 16 2.5" hot-swap SAS/SATA HDDs. Eight 3.5" hot-swap SAS/SATA HDDs.
Maximum internal storage	12.0 TB of 3.5" simple-swap SATA HDDs; 24.0 TB of 3.5" hot-swap SATA/SAS HDDs; or 16 TB of 2.5" hot-swap SAS or 16 TB of SATA HDDs
Network interface	Integrated dual Gigabit Ethernet
Power supply (std/max)	920 W (1/2) or 670 W (1/1) (model dependent)
Hot-swap components	Fans and hard disk drives standard, power supply
RAID support	Integrated 6 Gbps or 3 Gbps RAID-0, -1, -1E (model dependent), optional RAID-10, -5, -50, -6, -60
Systems management	Integrated systems-management processor
Operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware vSphere/ESX/ESXi
Limited warranty	3-year customer-replaceable unit and on-site limited warranty

- x3400 M3 details on PartnerWorld
- x3400 M3 details on IBM.com
- x3400 M3 competitive info on COMP
- x3400 M3 configuration details
- x3400 M3 options
- x3400 M3 blog search
- x3400 M3 Twitter search

Figure T.3.   IBM System x3400 M3 at a glance (and links to more detail).

Select configurations of the x3400 M3 are part of the IBM Express Advantage Portfolio designed to meet the needs of mid-size businesses. Easy to manage, Express models and configurations vary by country.

Here are some quick x3400 M3 facts:

- Provides optimum performance and processing capability at a lower cost

- Offers large storage capacity and flexible configurations to scale as needs grow

- Helps reduce energy costs and ease management with efficient design.

x3500 M4

The IBM System x3500 M4 (Figure T.4) is a high-performance dual-socket tower server that can deliver the scalability, reliable performance, and optimized efficiency for your business critical applications. Start with the basics and upgrade as your business changes without jeopardizing existing investments. Virtualizing the PC infrastructure into one server can provide access to a powerful server with abundant storage space, while significantly reducing IT costs.

The x3500 M4 supports the latest Intel microarchitecture, delivering intelligent performance enhancements that adapt to your workload environment. The x3500 M4 provides triple the storage capacity of the x3500 M3 without the cost of external devices. A flexible design and consolidated server help optimize intensive workloads and provide greater utilization,

Specifications

Form factor/height	Tower/5U (rack-mountable)
Processor (max)	Up to two Intel Xeon Processor E5-2600 product family
Number of processors (std/max)	1/2
Cache (max)	Up to 20 MB per processor
Memory (max)	Up to 768 GB 24 slots (UDIMM/RDIMM/LRDIMM)
Expansion slots	Up to eight PCIe expansion slots; Six PCIe slots standard, plus two additional PCIe slots when the second processor is populated. An optional PCI-X slot is available via an interposer conversion kit.
Disk bays (total/hot-swap)	Eight 2.5" hot-swap or eight 3.5" hot-swap bays standard, up to 32 2.5" hot-swap bays via optional upgrade kit, or eight 3.5" simple-swap bays via configure to order
Maximum internal storage	32 TB of 2.5" hot-swap SAS/SATA (HDD upgrade options required) or 24 TB of 3.5" hot-swap or simple-swap SAS/SATA HDDs
Network interface	Intel I350AM4 quad-port Gigabit Ethernet
RAID support	Integrated 6 Gbps hardware RAID-0, -1, -10, optional RAID-5, -6, -10, -50, -60
Systems management	IMM2 with dedicated management port
Operating systems	Microsoft Windows Server 2008 R2, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware vSphere Hypervisor
Limited warranty	3-year customer-replaceable unit and on-site limited warranty, next business day 9x5, service upgrades available

- x3500 M4 details on PartnerWorld
- x3500 M4 details on IBM.com
- x3500 M4 competitive info on COMP
- x3500 M4 configuration details
- x3500 M3 options
- Redbook: x3500 M4 Product Guide
- x3500 M4 blog search
- x3500 M4 Twitter search

Play video
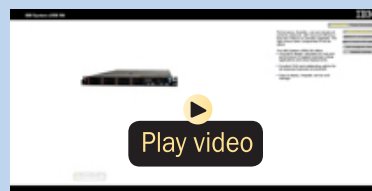
x3500 M4 virtual tour

Figure T.4.   IBM System x3500 M4 at a glance (and links to more detail).

making the x3500 M4 a great choice for small and medium businesses.

The Integrated Management Module 2 (IMM2) and Unified Extensible Firmware Interface (UEFI) BIOS give the x3500 M4 a consistent system level code stack for superior setup, configuration, and ease of use. Optional remote control features provide the ability to manage, monitor, and troubleshoot from anywhere. Powerful and easy-to-use tools can help you manage both physical and virtual resources. Select configurations of the x3500 M4 are part of the IBM Express Portfolio designed to meet the needs of small and mid-size businesses. Easy to manage, Express models vary by country.

Here are some quick x3500 M4 facts:

- Offers flexible scalability features designed to grow with your business needs

- Provides abundant storage capacity to help safeguard data

- Enables easy installation, use, and management across long distances.

Rack-Mount Servers

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

MORE ON THE WEB
• Overview of all System x rack servers
• Rack server comparison chart

x3250 M3

The IBM System x3250 M3 (<u>Figure R.1</u>) is a single-socket server that offers new levels of performance and flexibility to help you respond quickly to changing business demands. Cost-effective and compact, it is well-suited for small to mid-size businesses as well as large enterprises, whether for general-purpose workloads or specialized applications.

Built with the latest Intel Xeon 3400 Series or Celeron, Pentium, or Core i3 dual-core processors, the x3250 M3 has industry-leading computing capabilities in a small, 1U footprint. It also offers substantial memory and storage capacity to help you manage your data efficiently.

The x3250 M3 features support for IBM Systems Director Active Energy Manager to help you monitor and control power consumption in your IT environment. An option to upgrade to a high-efficiency power supply is also available.

To help you stay focused on your core business, the x3250 M3 offers easy deployment, update management, and much more with its built-in IBM Tool Center. It delivers leadership reliability, management, and flexibility while helping you protect your IT investments and lower your operating costs.

Select configurations of the x3250 M3 are part of the IBM Express Advantage Portfolio, designed to meet the needs of mid-size businesses. Easy to manage, Express models/configurations vary by country.

Here are some quick x3250 M3 facts:

- Maximize performance with the latest Intel technology in a robust, flexible platform

Specifications

Form factor/height	Rack/1U
Processor (CPU GHz/L3 cache/front-side bus MHz max)	Intel Xeon 3400 Series (quad-core) up to 2.93 GHz/8 MB/1333 MHz or Intel Celeron, Pentium or Core i3 (dual-core) up to 3.06 GHz/4 MB/1333 MHz
Number of processors (std/max)	1/1
Cache (max)	8 MB L3
Memory (max)	Up to 32 GB DDR-3 ECC memory, up to 1333 MHz; 1 GB, 2 GB, 4 GB UDIMMs;1 GB, 2 GB, 4 GB, 8 GB RDIMMs
Expansion slots	2 PCIe x8 Gen2, dedicated PCIe x4 for RAID-0, -1, optional PCI-X (special bid only)
Disk bays (total/hot-swap)	Two 3.5" simple-swap SATA or 3.5" hot-swap SAS/SATA, or four 2.5" hot-swap SAS HDDs
Maximum internal storage	2.0 TB SATA or SAS
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	351 W 1/1
Hot-swap components	Two 3.5" hot-swap SAS/SATA or four 2.5" hot-swap SAS HDDs
RAID support	Hot-swap hardware RAID-0, -1 (standard), simple swap hardware RAID-0, -1 (optional); optional RAID-5
Ports	7 USB 2 Ethernet, 1 serial and video
Systems management	Integrated Management Module with IPMI 2.0 and Serial over LAN, IBM Systems Director, ServerGuide, optional Virtual mediakey, Trusted Platform Module 1.2
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware vSphere/ESX/ESXi
Limited warranty	1- or 3-year customer replaceable unit/on-site limited warranty

- x3250 M3 details on PartnerWorld
- x3250 M3 details on IBM.com
- x3250 M3 competitive info on COMP
- x3250 M3 configuration details
- x3250 M3 options
- x3250 M3 blog search
- x3250 M3 Twitter search

x3250 M3 animated demo

Figure R.1. IBM System x3250 M3 at a glance (and links to more detail).

- Achieve energy savings with built-in power management tools

- Minimize risks with easy serviceability and maintenance.

x3250 M4

The IBM System x3250 M4 server (Figure R.2) delivers the latest Intel processor technology in an ultra-small, single-socket rack server. Priced for value and built for performance, the x3250 M4 offers vast server-level memory capacity, standard low-cost ServeRAID-C100 technology, and dual network adapters. The x3250 M4 meets 80-PLUS certification for power supply units to enable greater energy efficiency and savings.

With a flexible subsystem and wide range of configuration options, the x3250 M4 enables you to choose the level of computing power you need today and grow to meet increased application requirements. Choose hard disk drive size and storage capacity, dual- or quad-core processors—or even advanced protection RAID.

The x3250 M4 offers standard ServeRAID-C100 for IBM System x servers, which supports RAID-0, -1, -10 functions. Powerful integrated systems management tools facilitate fast deployment and setup and can help you manage, monitor, and troubleshoot from virtually anywhere.

Select configurations of the x3250 M4 are part of the IBM Express Advantage Portfolio designed to meet the needs of small and midsizedbusinesses. Easy to manage, Express models and configurations vary by country.

Here are some quick x3250 M4 facts:

Specifications

Form factor/height	Rack/1U
Processor (max)	Intel Xeon E3-1200 series (quad-core) up to 3.5 GHz/8 MB/1333 MHz, Intel Core i3 2100 series (dual-core) up to 3.3 GHz/3 MB/1333 MHz, Pentium (dual-core) up to 3.0 GHz/3 MB/1333 MHz
Number of processors (std/max)	1/1
Cache (max)	8 MB L3
Memory (max)	Up to 32 GB DDR-3 ECC memory, up to 1333 MHz; 1 GB, 2 GB, 4 GB and 8 GB UDIMMs
Expansion slots	1 PCIe x8, one PCIe x4 for RAID-0, -1
Disk bays (total/hot-swap)	Two 3.5" simple-swap SATA or four 2.5" hot-swap/simple-swap SAS (simple-swap 2.5" via CTO only)
Maximum internal storage	6.0 TB, optical drive device optional
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	300 W (1/1) or redundant 460 W (1/2)
Simple-swap components	Two 3.5" simple-swap SATA or four 2.5" hot-swap/simple-swap SAS HDDs (model dependent)
RAID support	Simple-swap SATA models—ServeRAID-C100 for IBM System x; hot-swap SAS model hardware RAID-0, -1 is standard (model dependent); optional hardware RAID-5
Systems management	Integrated Management Module 2 with IPMI 2.0 and Serial over LAN; IBM Systems Director, ServerGuide
Operating systems	Microsoft Windows Server 2008 R2/Microsoft Windows Server 2008, Red Hat Linux, SUSE Linux
Limited warranty	3-year customer replaceable unit/on-site limited warranty

- x3250 M4 details on PartnerWorld
- x3250 M4 details on IBM.com
- x3250 M4 competitive info on COMP
- x3250 M4 configuration details
- x3250 M4 options
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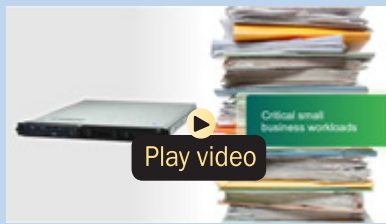
x3250 M4 animated demo

Figure R.2.   IBM System x3250 M4 at a glance (and links to more detail).

- Provides next-generation performance in an innovative, compact design

- Offers a wide range of configuration options and flexibility for cost-effective growth

- Builds on IBM server tradition with integrated data protection and systems management capabilities.

x3550 M4

The IBM System x3550 M4 (Figure R.3) blends outstanding uptime, performance, and I/O flexibility for cost efficiency and rock-solid reliability. This compact rack server offers an energy-smart, affordable, and easy-to-use solution with a pay-as-you-grow design to help lower costs and manage risks. With more computing power per watt, support for the latest Intel Xeon E5-2600 series processors and advanced memory support, the x3550 M4 offers balanced performance and density.

With redundant and hot-swap fans, disks, and power supplies, the x3550 M4 provides a resilient architecture ideal for business-critical applications. Predictive Failure Analysis and light path diagnostics provide advanced warning on power supplies, fans, VRMs, disks, processors, and memory. Redundant, hot-swap components make it easy to replace failures without taking your system down.

The Integrated Management Module 2 (IMM2) and Unified Extensible Firmware Interface (UEFI) give the x3550 M4 a consistent system-level code stack for superior setup, configuration, and ease of use. Optional Feature on Demand (FoD) remote presence provides the ability to manage, monitor,

Specifications

Form factor/height	1U RAck
Processor (max)	Up to two 8-core Intel Xeon E5-2600 series processors
Cache (max)	20 MB per processor
Memory (max)	Up to 768 GB via 24 slots (UDIMM/RDIMM/LRDIMM)
Media bays	One optional DVD bay for 2.5" model
Disk bays	Eight 2.5" or three 3.5" hard disk drives (HDDs)
RAID support	Integrated 6 Gbps hardware RAID-0, -1, -10; optional RAID-5, -50 or -6, -60
Power supply (std/max)	1/2 redundant 550 W ac, 750 W ac, or 750 W dc (model dependent)
Hot-swap components	Power supplies, fan modules and hard disk drives
Network interface	4 x 1 GbE (std.), 2 x 10 GbE embedded adapter (slotless opt.)/Trusted Platform Module
Expansion slots	2 PCIe 3.0 slots, optional 1 PCI-X
USB ports	2 (three for 3.5" model) front/4 back/1 internal
VGA ports	1 front/1 back
Maximum internal storage	Up to 8 TB (2.5" model) or 9 TB (3.5" model) SAS/SATA
Energy-efficiency compliance	Equivalent NEBS 1/ETSI compliance for both ac and dc power supply, compliant with 80 PLUS Platinum and ENERGY STAR (model dependent)
Systems management	IBM IMM2 with optional FoD remote presence, Predictive Failure Analysis, Diagnostic LEDs, light path diagnostics panel, automatic server restart, IBM Systems Director and IBM Systems Director Active Energy Manager
Operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware vSphere
Limited warranty	3-year customer replaceable unit and onsite service, next business day 9x5, service upgrades available

- x3550 M4 info on PartnerWorld
- x3550 M4 info on IBM.com
- x3550 M4 competitive info on COMP
- x3550 M4 configuration details
- x3550 M4 options
- Redbook: x3550 M4 Product Guide
- x3550 M4 blog search
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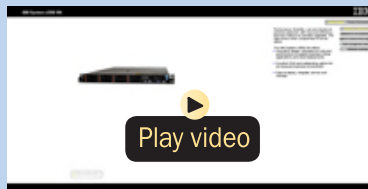
x3550 M4 Animated Demo

Figure R.3.   IBM System x3550 M4 at a glance (and links to more detail).

and troubleshoot from anywhere. Powerful tools can help you manage both physical and virtual resources.

Select configurations of the x3550 M4 are part of the IBM Express Portfolio designed to meet the needs of small and mid-size businesses. Easy to manage, Express models vary by country.

Here are some quick x3550 M4 highlights:

- Innovative design, optimized for cost and performance to support business-critical applications and cloud deployments

- Excellent RAS and outstanding uptime for an improved business environment

- Easy to deploy, integrate, service and manage.

x3620 M3

The IBM System x3620 M3 (Figure R.4) gives growing businesses a flexible, two-socket server designed to keep costs down. Built on the latest Intel Xeon technology, the x3620 M3 helps lower costs by providing energy efficiency, integrated software RAID and support for up to eight high capacity, low-cost 3.5-inch hard disk drives.

Reliable and easy to manage, the x3620 M3 is backed by IBM service and support. Embedded RAID and an optional 6 Gbps adapter can protect your data, while optional redundant power and cooling promote uptime. Access to IBM Systems Director, ToolsCenter and IBM Integrated Managed Module (IMM) capabilities offer proactive support to help maintain availability.

Specifications

Form factor/height	Rack/2U
Processor (max)	Up to two 3.06 GHz 6-core (3.20 GHz 4-core) Intel Xeon 5600 series processors with QuickPath Interconnect technology, up to 1333 MHz memory access speed; Also supports select Intel Xeon 5500 series processors
Number of processors (std/max)	1/2
Cache (max)	Up to 12 MB L3
Memory (max)	Up to 192 GB in 12 slots, using RDIMMs
Expansion slots	Two x8 PCIe Gen II slots and one x4 PCIe Gen II buried slot
Disk bays (total/hot-swap)	Up to four 3.5" simple-swap SATA HDDs or up to eight 3.5" hot-swap SAS/SATA HDDs
Maximum internal storage	Up to 24.0 TB hot-swap SAS or SATA
Network interface	Integrated two ports
Power supply (std/max)	1/2; 460 W or 675 W HE each
Hot-swap components	Power supplies, HDDs
RAID support	Embedded software RAID-0, -1 or hardware RAID-0, -1, -1E or RAID-0, -1, -10 (optional -5 with SED function) or RAID-0, -1, -10, -5, -50 (optional -6, -60 with SED function and optional battery), model dependent
Systems management	IBM IMM with Virtual Media Key, Predictive Failure Analysis, Integrated Service Processor, light path diagnostics panel, automatic server restart, IBM Systems Director and Active Energy Manager, IBM ServerGuide
Operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware vSphere/ESX/ESXi, Oracle Solaris 10 (model dependent)

- x3620 M3 details on PartnerWorld
- x3620 M3 details on IBM.com
- x3620 M3 competitive info on COMP
- x3620 M3 configuration details
- x3620 M3 options
- x3620 M3 blog search
- x3620 M3 Twitter search
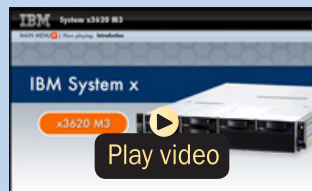
x3620 M3 animated demo

Figure R.4. IBM System x3620 M3 at a glance (and links to more detail).

The x3620 M3 offers a customizable design and multiple configurations that let you start small and grow at your own pace. As your requirements change, you can cost-effectively add enterprise features—including advanced RAID, full redundancy, hot-swap hard disk drives and remote management capabilities.

Select configurations of the x3620 M3 are part of the IBM Express Advantage Portfolio designed to meet the needs of mid-size businesses. Easy to manage, Express models vary by country.

Here are some quick x3620 M3 highlights:

- An ideal platform for cost-sensitive clients who require 2-socket performance and high storage capacity

- A dependable server with simplified management backed by IBM service, support and tools

- Customizable design and flexible configurations for affordable growth.

x3630 M3

The IBM System x3630 M3 (Figure R.5) is a storage-rich dual-socket 2U server that integrates the leadership features of traditional enterprise server offerings with affordable components to deliver outstanding value to cost-conscious buyers. Based on the latest Intel Xeon processor technology, the x3630 M3 offers high performance and maximum storage capacity. It provides up to 28 TB of internal storage capacity for

Specifications

Form factor/height	Rack/2U
Processor (max)	Up to two 3.06 GHz 6-core (3.20 GHz 4-core) Intel Xeon 5600 series processors with QuickPath Interconnect technology, up to 1333 MHz memory access speed
Number of processors (std/max)	1/2
Cache (max)	Up to 12 MB L3
Memory (max)	Up to 192 GB DDR-3 RDIMM memory via 12 DIMM slots
Expansion slots	3 PCIe slots
Disk bays (total/hot-swap)	Up to 14 3.5" hot-swap SAS/SATA or up to 28 2.5" hot-swap SAS/SATA
Maximum internal storage	Up to 42 TB
Network interface	Dual Gigabit Ethernet
Power supply (std/max)	1/2; 675 W, 675 W HE each
Hot-swap components	Power supplies, hard disk drives
RAID support	6 Gbps RAID -0, -1, -10 standard, upgradeable to hardware RAID-5 or RAID-6 (model dependent)
Systems management	IBM Systems Director, IBM Systems Director Active Energy Manager, IMM (Integrated Management Module) with IPMI 2.0 support, UEFI (Unified Extensible Firmware Interface), IBM ToolsCenter, status LEDs
Operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware
Limited warranty	3-year customer replaceable unit and on-site limited warranty

- x3630 M3 details on PartnerWorld
- x3630 M3 details on IBM.com
- x3630 M3 competitive info on COMP
- x3630 M3 configuration details
- x3630 M3 options
- x3630 M3 blog search
- x3630 M3 Twitter search

x3630 M3 animated demo

Figure R.5.   IBM System x3630 M3 at a glance (and links to more detail).

a much lower cost per terabyte than external storage, making it an ideal solution for storage-intensive workloads.

The x3630 M3 helps keep your business running smoothly with availability features that include redundant cooling fan modules and hot-swap/redundant power supplies, RAID protection, and predictive failure analysis. The x3630 M3 also offers a comprehensive suite of systems management tools that help simplify management tasks.

With the flexible design of the x3630 M3, you can choose the configuration that meets your needs today, knowing you can easily upgrade to more robust features as your needs change over time. With energy-efficient components that help reduce operating costs, the x3630 M3 is a cost-optimized offering that delivers value over the long term.

Here are some quick x3630 M3 highlights:

- Meet growing performance and storage demands with a cost-effective, high-capacity solution

- Achieve high levels of system availability, backed by IBM's legendary support

- Design the configuration that meets your needs today, with the freedom to upgrade as needs change over time.

x3650 M4

The IBM System x3650 M4 (Figure R.6) blends outstanding uptime, performance, and I/O flexibility for cost efficiency and rock-solid reliability. The powerful server offers an energy-smart, affordable, and easy-to-use rack solution

Specifications

Form factor/height	2U Rack
Processor (max)	Up to two 8-core Intel Xeon E5-2600 series processors
Cache (max)	20 MB per processor
Memory (max)	Up to 768 GB via 24 slots (UDIMM/RDIMM/LRDIMM/HCDIMM)
Media bays	Optional DVD and tape drive bay
Disk bays	Sixteen 2.5" or six 3.5" HDDs or thirty-two 1.8" SSDs
RAID support	IBM ServeRAID M5110e RAID on motherboard, integrated 6 Gbps hardware RAID-0, -1, -10, and optional RAID-5, -50 or -6, -60
Network interface	4 × 1 GbE (std.), 2 × 10 GbE Embedded Adapter (slotless opt.)/TPM
Power supply (std/max)	1/2 redundant 550 W ac, 750 W ac, 900 W ac, or 750 W dc (model dependent)
Hot-swap components	Power supplies, fan modules, hard disk drives
Expansion slots	4 - 6 PCIe 3.0 ports, optional 4 PCI-X or 2 double-width PCIe (for GPU by special bid)
USB ports	2 front/4 back/2 internal
VGA ports	1 front/1 back
Maximum internal storage	Up to 16 TB (2.5" model) or 18 TB (3.5" model) SAS/SATA
Energy-efficiency complaince	Equivalent NEBS 1/ETSI compliance for both ac and dc power supply, compliant with 80 PLUS Platinum and ENERGY STAR (model dependent)
Systems management	IBM IMM2 with optional FoD remote presence, Predictive Failure Analysis, Diagnostic LEDs, light path diagnostics panel, Automatic Server Restart, IBM Systems Director and Active Energy Manager
Operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware vSphere

- x3650 M4 details on PartnerWorld
- x3650 M4 details on IBM.com
- x3650 M4 competitive info on COMP
- x3650 M4 configuration details
- x3650 M4 options
- Redbook: x3650 M4 Product Guide
- x3650 M4 blog search
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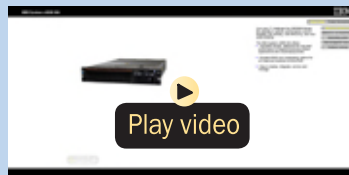
x3650 M4 animated demo

Figure R.6.   IBM System x3650 M4 at a glance (and links to more detail).

with a pay-as-you-grow design to help lower costs and manage risks. With more computing power per watt and the latest Intel Xeon E5-2600 series processors, advanced memory support, and greater disk capacity for businesses requiring extreme storage, the x3650 M4 offers balanced performance and density.

With redundant hot-swap fans, disks, and power supplies, the x3650 M4 provides a resilient architecture ideal for business-critical applications. Predictive Failure Analysis and light path diagnostics provide advanced warning on power supplies, fans, VRMs, disks, processors, and memory. Redundant hot-swap components make it easy to replace failures without taking your system down.

The Integrated Management Module 2 (IMM2) and Unified Extensible Firmware Interface (UEFI) give the x3650 M4 a consistent system-level code stack for superior setup, configuration, and ease of use. Optional Feature on Demand (FoD) remote presence provides the ability to manage, monitor, and troubleshoot from anywhere. Powerful and easy-to-use tools can help you manage both physical and virtual resources.

Select configurations of the x3650 M4 are part of the IBM Express Portfolio designed to meet the needs of small and mid-size businesses. Easy to manage, Express models vary by country.

Here are some quick x3650 M4 highlights:

- Innovative design, optimized for cost and performance, supports business-critical applications and cloud deployments

- Excellent RAS and outstanding uptime for an improved business environment

- Easy to deploy, integrate, service, and manage.

x3755 M3

The IBM System x3755 M3 (Figure R.7) is a four-socket server that provides outstanding performance and capacity in a data center-friendly 2U footprint. Based on the 8-, 12-, or 16-core AMD Opteron 6200 Series platform, the x3755 M3 helps organizations scale as workload demands increase, accommodating up to 64 processor cores and 512 GB of memory for cost-effective scaling.

The x3755 M3 is an ideal server for business workloads including database, virtualization, Java, and enterprise applications such as ERP. The increased processor density helps reduce networking complexity and cost for high-performance computing environments, and the available 16 TB of internal storage facilitates data-intensive applications like business intelligence.

Offering flexible configuration options, the x3755 M3 is a natural choice for workloads that are outgrowing the performance and capacity available on their legacy two-processor servers. The x3755 M3 helps IT organizations bridge the gap between two-socket and four-socket systems by providing a high-performance four-socket option in a cost-effective 2U design.

Here are some quick x3755 M3 facts:

Specifications

Form factor/height	Rack/2U
Processor (max)	Up to 3.0 GHz 8-core or 2.6 GHz 16-core AMD Opteron 6200 Series processors
Number of processors (std/max)	4/4
Cache (max)	12 MB L3
Memory (max)	Up to 512 GB DDR-3 RDIMM memory or 128 GB DDR-3 UDIMM memory via 32 DIMM slots
Expansion slots	Four PCIe slots
Disk bays (total/hot-swap)	Up to 8 hot-swap SAS/SATA, optional up to 6 simple-swap SATA
Maximum internal storage	Up to 24 TB
Network interface	Integrated quad Gigabit Ethernet ports
Power supply (std/max)	1/3 1100 W
Hot-swap components	Power supplies, fan modules, HDDs
RAID support	6 Gbps RAID-0, -1, -10 standard, upgradeable to hardware RAID-5
Systems management	IBM Systems Director, light path diagnostics panel, KVM over IP for remote management
Operating systems	Microsoft Windows Server, SUSE Linux, Red Hat Linux, VMware
Limited warranty	3-year customer-replaceable unit and on-site limited warranty

- x3755 M3 details on PartnerWorld
- x3755 M3 details on IBM.com
- x3755 M3 competitive info on COMP
- x3755 M3 configuration details
- x3755 M3 options
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x3755 M3 overview (3:28)

Figure R.7. IBM System x3755 M3 at a glance (and links to more detail).

- Meet growing workload demands with cost-effective processor and memory scaling

- Delivers value, performance, and memory for mid-size workloads

- Realize the benefits of four-socket architecture in a slim 2U server.

Enterprise Servers

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

MORE ON THE WEB
• Overview of all System x Enterprise Servers

x3690 X5

The IBM System x3690 X5 (Figure E.1) delivers four-processor performance, memory capacity, and reliability features in a slim, breakthrough two-processor system that incorporates Intel Xeon processors and fifth-generation IBM X-Architecture (eX5) technology. By purchasing a system with two fewer processors, you can cut your licensing costs in half while using less energy for a lower total cost of ownership. And you won't have to trade performance for a denser form factor. The x3690 X5 offers leadership performance, including the ability to better handle database transactions than industry-standard two-processor servers.

Specifications

Form factor/height	Rack/2U per chassis
Processor (max)	Intel Xeon up to 2.4 GHz (10 core)/1066 MHz memory access
Number of processors (std/max)	1/2
Cache (max)	Up to 30 MB
Memory (std/max)	8 GB/1 TB PC3-10600 DDR3 or DDR3L, up to 2.0 TB with 32 GB DIMM and MAX5
Expansion slots	5 total PCIe Gen 2
Disk bays (total/hot-swap)	16/16 2.5" Serial Attached SCSI (SAS) or 24/24 1.8" SAS SSD internal storage
Maximum internal storage	9.6 TB SAS per chassis (supports 73.4 GB, 146.8 GB, 300 GB, 500 GB, and 600 GB hard disk drives, 50 GB and 200 GB SSD)
Network interface	Integrated dual Gigabit Ethernet with TCP-IP off-load engine, optional Emulex 10 GbE Virtual Fabric Adapter
Power supply (std/max)	675 W 220 V 1/4
Hot-swap components	Power supplies, fans, hard disk drives
RAID support	Integrated RAID-0, -1, optional RAID-5, -6
Systems management	Alert on LAN 2, automatic server restart, IBM Systems Director, IBM ServerGuide, IMM, light path diagnostics (independently powered), predictive failure analysis on hard disk drives, processors, VRMs, fans and memory, Wake on LAN, dynamic system analysis
Operating systems	Microsoft Windows Server 2008 (Standard, Enterprise and Datacenter editions 64-bit), 64-bit Red Hat Enterprise Linux and SUSE Enterprise Linux, VMware vSphere Hypervisor

- x3690 X5 details on PartnerWorld
- x3690 X5 details on IBM.com
- x3690 X5 competitive info on COMP
- x3690 X5 configuration details
- x3690 X5 options
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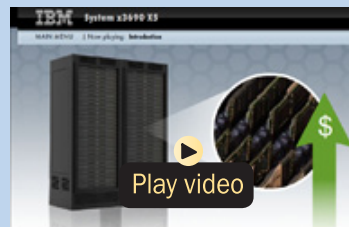
x3690 X5 animated overview

Figure E.1. IBM System x3690 X5 at a glance (and links to more detail).

The x3690 X5 features greater flexibility to help you meet changing workload demands as your business grows. With MAX5, you can double the memory capacity of your two-processor system to 64 DIMM slots. Increase utilization and optimize your investments by fitting 100 percent more virtual machines per system at half the cost per virtual machine with MAX5 memory expansion. An easy upgrade path and custom-izable growth options offer freedom of choice. For example, you can add more memory without having to purchase un-needed processing capabilities

Here are some quick x3690 X5 facts:

- Designed for virtualization, database, and enterprise work-loads

- Achieve four-processor performance at a two-processor in-vestment

- Grow to meet changing workload demands with unmatched memory expansion

- Own and operate your systems with less complexity and cost

- Get peace of mind with enterprise-class reliability and avail-ability.

x3850 X5/x3950 X5

The new IBM System x3850 X5 and x3950 X5 (Figure E.2) offer superior performance and unbeatable reliability within an energy- and wallet-friendly design. Best of all, they offer ultimate flexibility to help you get what you need, when you

Specifications

Form factor/height	Rack/4U per chassis
Processor (max)	Intel Xeon up to 2.4 GHz (10-core)/1066 MHz memory access
Number of processors (std/max)	2/4 per node (optional 2-node support)
Cache (max)	Up to 30 MB
Memory (max)	32 GB/2.0 TB max PC3-10600 DDR3L, up to 3.0 TB with MAX5
Expansion slots	7 total PCIe half-length
Disk bays (total/ hot-swap)	8/8 2.5" Serial Attached SCSI (SAS) or 16/16 SAS SSD
Maximum internal storage	4.8 TB per chassis (supports 8 x 73.4 GB, 146.8 GB, 300 GB, 500 GB, and 600 GB SAS hard disk drives; 8 x 160 GB and 500 GB SATA hard disk drives, or 16 x 50 GB and 200 GB solid state drives)
Network interface	10 Gbps Fibre Channel over Ethernet Dual Channel Converged Network Adapter, integrated dual Gigabit Ethernet with TCP-IP off-load engine, 10 Gbps Ethernet
Power supply (std/max)	1975 W 220 V 2/2
Hot-swap components	Power supplies, fans, hard disk drives, and solid-state drives
RAID support	Integrated RAID-0, -1; optional RAID-5, -6
Systems management	Alert on LAN 2, Automatic Server Restart, IBM Systems Director, IBM ServerGuide, Integrated Management Module (IMM), light path diagnostics (independently powered), Predictive Failure Analysis on hard disk drives, processors, VRMs, fans and memory, Wake on LAN, Dynamic System Analysis, QPI Faildown
Operating systems	Microsoft Windows Server 2008 (Standard, Enterprise and Data Center Editions 64-bit), 64-bit Red Hat Enterprise Linux, 64-bit SUSE Enterprise Linux (Server and Advanced Server), VMware vSphere Hypervison
Limited warranty	3-year customer-replaceable unit and on-site limited warranty

- x3850 X5/x3950 X5 details on PartnerWorld
- x3850 X5/x3950 X5 details on IBM.com
- x3850 X5/X3950 X5 competitive info on COMP
- x3850 X5/x3950 X5 configuration details
- x3850 X5/x3950 X5 options
- x3850 X5 blog search
- x3850 X5 Twitter search
- SAP HANA

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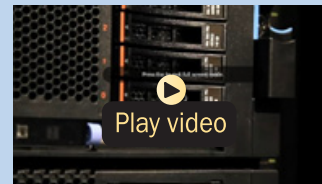
x3850 X5 at Acxiom (3:49)

Figure E.2.   IBM System x3850 X5/x3950 X5 at a glance (and links to more detail).

need it. The x3950 X5 offers simple-to-deploy, preconfigured systems that are optimized for specific workloads. The x3950 X5 database optimized systems offer the right balance of processing power, memory, and eXFlash high-performance storage technology for your database workloads. x3950 X5 virtualization optimized systems with embedded VMware vSphere Hypervisor come standard with MAX5 for unmatched memory capacity, allowing you to increase the size and quantity of your virtual machines. The x3950 X5 SAP High Performance Analytics Appliance (HANA) helps provide super-charged analytics performance for businesses that need time-ly answers to vital business questions.

The x3850 X5 server allows freedom of choice with ex-tremely flexible configurations plus memory expansion capa-bilities. A modular building block design lets you customize your system for current needs while providing the ability to react to changing workloads. Expand from a two-processor system up to four processors. Add a second system to create an eight-processor system. Start with two memory DIMMs and expand up to 192 with a dual-node system and two MAX5 memory expansion options. Reallocate resources as your environment changes. The x3850 X5 meets your needs today, while providing an easy, cost-effective upgrade path to change your environment when you're ready.

Here are some quick x3850 X5/x3950 X5 facts:

- Unmatched flexibility to meet changing workload demands

- Balanced systems for virtualization, database, and enterprise workloads

- Workload-optimized systems with customizable configurations for target workloads

- Achieve greater performance and utilization at a lower total cost

- Keep consolidated workloads up and running with mainframe-inspired reliability

- Easy-to-own, simplified power and systems management with an energy-smart design and remote access.

iDataPlex/Cluster Servers

Next we explore the iDataPlex and System x Clusters used for a wide variety of workloads including high performance computing, virtualization, and grid deployments.

iDataPlex

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

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

- 45 iDataPlex Systems listed in the latest Top 500 Supercomputer list (top500.org)

- 44 iDataPlex Systems listed in the latest Green 500 list (green500.org)

- iDataPlex received the 2010 HPCwire Readers' Choice Award for Best HPC Server Product or Technology.

iDataPlex dx360 M4

The IBM System x iDataPlex dx360 M4 (Figure I.1) is designed to optimize density and performance within typical data center infrastructure limits. The unique half-depth form factor is designed to help you improve compute density in your space-constrained data center while also improving system cooling and energy efficiency.

With options from highly efficient low-voltage 60 W processors to high-performance 130 W processors, you can precisely balance your performance needs against energy usage. Up to 4 GPUs per 2U chassis can also be included as expansion options for those specialty workload needs. Networking choices include Ethernet up to 10 Gbps and InfiniBand connectivity. Also choose from three storage configurations based on performance and capacity needs. A range of power supply selections round out flexible configuration options, so you can choose the right system to support your workloads within your data center power and cooling envelope and budget limits.

Here are some quick dx360 M4 facts:

- Extraordinary performance for your most-demanding applications

- Half-depth design provides power and cooling efficiency and ultimate data center space savings

- Easy to deploy, integrate, service, and manage.

Specifications

Form factor/height	Half-depth, 2U chassis with up to two planar trays
Processor (max)	Two 2.7 GHz 8-core Intel Xeon E5-2600 Series processors
Number of processors (std/max)	2/2
Cache (max)	Up to 20 MB
Memory (max)	Up to 256 GB DDR-3 via 16 DIMM slots (UDIMM/RDIMM)
Expansion slots	Up to 2 PCIe Gen 3.0 slots
Disk bays (total)	One 3.5" simple-swap SATA or two 2.5" simple swap SAS/SATA HDDs or SSDs, or four 1.8" simple-swap SSDs
Maximum internal storage	Up to 6.0 TB per 2U chassis
Network interface	2 × 1 GbE (std.), 2 InfiniBand FDR10 ports (slotless option), 2 × 10 GbE (slotless option)
Power supply (std/max)	1/2; 550 W, 750 W, or 900 W with 80 PLUS Platinum certification, redundant
Hot-swap components	Power supplies
RAID support	Integrated 6 Gbps hardware RAID-0,-1,-10, optional RAID-5, -6, -10, -50, -60
Systems management	IMM v2 with dedicated management port
Operating systems	Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Microsoft Windows Server 2008 R2, 2008 (Datacenter, PC, Enterprise, and Web), VMware vSphere Hypervisor
Limited warranty	3-year customer-replaceable unit and on-site limited warranty, next business day 9x5, service upgrades available

- dx360 M4 details on PartnerWorld
- dx360 M4 details on IBM.com
- dx360 competitive info on COMP
- Redbook: dx360 M4 Product Guide
- dx360 M4 blog search
- dx360 M4 Twitter search
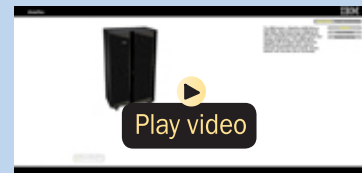
dx360 M4 virtual tour

Figure I.1.   IBM iDataPlex dx360 M4 at a glance (and links to more detail).

Intelligent Cluster

IBM Intelligent Cluster integrated solutions are built on the highly-innovative IBM System x rack, BladeCenter, and iData-Plex servers (Figure I.2). High Performance Computing (HPC) workloads will benefit by up to twice the performance. Our integrated cluster solutions offer significant price/performance advantages for many high-performance workloads by harnessing the advantages of highly innovative servers. By design, a range of application environments will benefit, including those optimized for industrial design and manufacturing, financial services, life sciences, government, and education.

Intelligent Cluster solutions that integrate BladeCenter or iDataPlex servers can reduce power and cooling costs by up to 50 percent, while maximizing performance density, which is critical for HPC workloads.

Intelligent Cluster integrated HPC solutions include servers, storage and industry-leading OEM interconnects that are factory-integrated, fully tested and delivered to your door, ready to plug into your data center, all with a single point of contact for support.

Here are some quick Intelligent Cluster facts:

- Leading-edge technology with flexibility of choice
- High performance
- Energy and space efficient
- Easily deployed, operated, and maintained.

Specifications

Systems	Blade servers: HX5, HS22, HS22V Enterprise servers: x3850 X5 iDataPlex servers: dx360 M3
Ethernet switches	IBM System Networking (BNT)
Ethernet adapters	Chelsio, Mellanox, Force10Networks
InfiniBand	Mellanox, QLogic, Voltaire
Fibre Channel	Emulex, QLogic
Storage servers	System Storage DS5020, DS5100, DS5300, DS3950, DS3500, DS3512, DS3524
Storage expansion	EXP5000 Storage Expansion Unit, EXP 2512 Storage Expansion Unit, EXP 2524 Storage Expansion Unit, EXP 520 Storage Expansion Unit, EXP 395 Storage Expansion Unit
Graphic Processing Units (GPUs)	NVIDIA Tesla M1060 , M2050, M2070 and M2070-Q Computing Modules
Operating systems	Red Hat Enterprise Linux, SUSE Linux Enterprise, Microsoft Windows HPC Server
Cluster management software	xCAT (Extreme Cloud Administration Toolkit), Moab Adaptive HPC Suite, Moab Adaptive Computing Suite, IBM General Parallel File System (GPFS) for Linux

- Intelligent Cluster details on PartnerWorld
- Intelligent Cluster info on IBM.com
- Intelligent Cluster competitive info on COMP
- Intelligent Cluster blog search
- Intelligent Cluster Twitter search

Play video
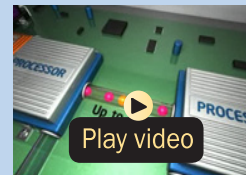
Cineca, Italy's largest computing center (4:39)

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

4

BladeCenter Product Quick Reference

What Is a BladeCenter Blade Server?

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

MORE ON THE WEB

- [Overview of BladeCenter servers](#)
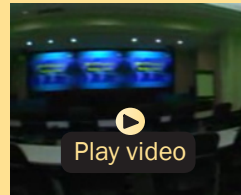
IBM BladeCenter: The right choice (6:55)

MORE ON THE WEB
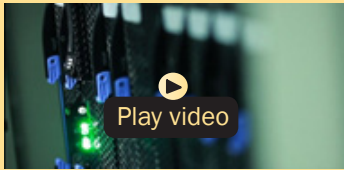
*IBM BladeCenter
Video Library*
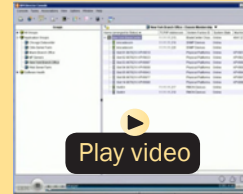
*IBM BladeCenter
Configuration Manager
Demo (4:46)*

shooting, etc., for local or remote configurations consisting of hundreds of server blades. Collectively, these characteristics are making the BladeCenter concept very popular in the marketplace.

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

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

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

BladeCenter servers have four elements:

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

- Modules—Components that are installed in hot-swap module bays provided in the BladeCenter chassis. These modules provide a number of common functions needed by the installed blades, the chassis, and the other modules. Modules include things like power supplies, systems-management modules, cooling fans, and network switches. IBM has published the specifications for the BladeCenter modules and options. This should result in a greater variety of options from a wider range of vendors than before.

- Blade servers—Processors, memory, and other circuitry packaged on a card that is installed in the chassis. The server blades used in BladeCenter are of three basic types: Intel/AMD processor-based, IBM POWER microprocessor–based, or Cell Broadband Engine-based.

- Expansion options—Cards installed in the blades that add function like additional network Ethernet attachments, fibre channel attachment, etc.

Chassis

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

BladeCenter S Chassis

The IBM BladeCenter S (Figure C.1) is the industry's first blade chassis uniquely designed for small and mid-size offices and distributed environments. Building in simplicity and economy, BladeCenter S is designed to get big IT results from the smallest IT staffs. Small enough to sit under your desk, the new BladeCenter S chassis makes it easy and cost-effective for small and mid-size businesses to obtain IT results at levels traditionally reserved for large enterprises.

With six blade servers, and a fully integrated Storage Area Network (SAN), the chassis simply plugs into an average wall socket, helping eliminate the need to own and operate costly data centers.

Within a single chassis, BladeCenter S supports virtually all of your applications—including those running on Microsoft Windows, Linux, IBM AIX, and IBM i—and integrates the hardware and software most used by mid-size businesses.

Here are some quick BladeCenter S chassis facts:

- All in one—integrates servers, SAN storage, networking, and I/O into a single chassis

- No special wiring needed—uses standard office power plugs supporting 100–240 V

Specifications

Form factor	Rack/7U incorporates blade server bays and hot-swap storage high-availability midplan
Blade bays	Up to six 1- or 2-processor, and up to three 4-processor
Disk bays	Up to two disk storage modules; each one can incorporate up to six 3.5" SAS, Nearline SAS or SATA, or an intermix of the disk
Standard media	Optional DVD multi-burner accessible from each blade server
Switch modules	4 switch module bay
Power supply module	Up to 4 (hot-swap and redundant 950 W/1450 W with load-balancing, auto-sensing and failover capabilities
Cooling modules	4 hot-swap and redundant blowers standard
Systems management	1 management module standard
I/O ports	Keyboard, video, mouse, Ethernet, USB
Systems management	Open and easy systems management and trial deployment tools
Predictive failure analysis	Hard disk drives, processors, blowers, memory
Light path diagnostics	Blade server, processor, memory, power supplies, blowers, switch module, management module, hard disk drives, and expansion card
External storage	Support for IBM System Storage solutions (including DS and NAS family of products) and many widely adopted non-IBM storage offerings
Limited warranty	3-year customer-replaceable unit and on-site limited warranty

- BladeCenter S chassis details on PartnerWorld
- BladeCenter S chassis details on IBM.com
- BladeCenter S chassis competitive info on COMP
- BladeCenter S configuration details
- BladeCenter S options
- BladeCenter S blog search
- BladeCenter S Twitter search

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

- Flexible modular technology—integrates a family of IBM blade servers supporting a wide range of operating systems and applications

- Easy to deploy, use, and manage—BladeCenter Start Now Advisor allows simple setup, so you can focus on your business, not your IT

- Helps build greener IT infrastructures—IBM Cool Blue technology delivers a portfolio of tools that helps plan, manage, and control power and cooling.

BladeCenter E Chassis

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

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

Here are some fast BladeCenter E facts:

- Maximizes productivity and minimizes power usage through energy-efficient design and innovative features

Specifications

Form factor/height	Rack-mount chassis/7U
Blade bays	Up to 14
Switch modules	4 switch module bays
Power supply module	Up to four 2000 W or 2320 W (hot-swap and redundant with load-balancing and failover capabilities)
Cooling modules	2 hot-swap and redundant blowers standard
Standard media	Optional DVD multi-burner
Systems management hardware	1 Advanced Management Module standard; add an optional second module for redundancy
I/O ports	Keyboard, video, mouse, Ethernet, USB
Systems management software	Open and easy systems management and trial deployment tools
Light path diagnostics	Chassis has LEDs for power status, location, over temperature, information and status indicators on both front and back; In addition, power supplies, blade servers, management module, switch modules and blowers have light path diagnostics
External storage	Support for IBM System Storage solutions (including DS and Network Attached Storage (NAS) family of products) and many widely adopted non-IBM storage offerings
Limited warranty	3-year customer-replaceable unit and on-site limited warranty

- BladeCenter E chassis details on PartnerWorld
- BladeCenter E chassis details on IBM.com
- BladeCenter E chassis Announcement Letter, Feb 06
- BladeCenter E chassis competitive info on COMP
- BladeCenter E configuration details
- BladeCenter E options
- BladeCenter E blog search
- BladeCenter E Twitter search

Play video

IBM BladeCenter E virtual tour

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

- Delivers extreme density and integration to ease data center space constraints

- Protects an organization's IT investment through IBM BladeCenter family longevity, compatibility, and innovation leadership in blades

- Supports the latest generation of IBM BladeCenter blades, providing investment protection

- Choice of 2000 W or 2320 W power supply to meet your IT infrastructure needs.

BladeCenter H Chassis

The BladeCenter H (Figure C.3) is a powerful platform built with the enterprise customer in mind, providing industry-leading performance, innovative architecture, and a solid foundation for virtualization. This next-generation chassis is a workhorse—it runs applications quickly and efficiently, enabling organizations to maximize their investment and succeed in a highly competitive market. The powerful BladeCenter H delivers the performance customers need to make informed decisions.

With IBM Open Fabric Manager, BladeCenter H can help organizations run applications even more efficiently by delivering a flexible, open, and connected infrastructure. IBM continues to build on its reputation for helping customers find innovative IT solutions with BladeCenter H, which delivers even more capabilities to the BladeCenter family. The 9U chassis provides the standard BladeCenter functionalities with

Specifications

Form factor/height	Rack-mount chassis/9U
Blade bays	Up to 14
Switch modules	Up to 4 traditional, up to 4 high-speed, and up to 4 bridge module bays
Power supply module	Up to 4 hot-swap and redundant 2980 W ac high-efficiency power supplies with load-balancing and failover capabilities; Operating at 200-240 V
Cooling modules	2 hot-swap and redundant blowers standard, additional fan packs on power supplies
Systems management hardware	Advanced Management Module standard; add an optional Advanced Management Module for redundancy
I/O ports	USB-based keyboard, video, mouse (KVM), Ethernet, USB
Media	2 USB connections and an optional DVD multi-burner
Systems management software	Systems management and trial deployment tools
Predictive failure analysis	Internal storage, processors, blowers, memory
Light path diagnostics	Blade server, processor, memory, power supplies, blowers, switch module, management module, internal storage and expansion card
External storage	Support for IBM System Storage solutions (Including DS and NAS family of products) and many widely adopted non-IBM storage offerings
Limited warranty	Three-year customer-replaceable unit and on-site limited warranty

- BladeCenter H chassis details on PartnerWorld
- BladeCenter H chassis details on IBM.com
- BladeCenter H chassis competitive info on COMP
- BladeCenter H configuration details
- BladeCenter H options
- BladeCenter H blog search
- BladeCenter H Twitter search
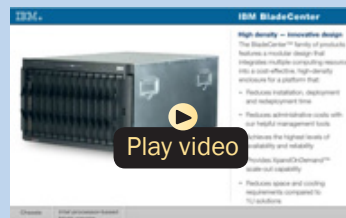
IBM BladeCenter H virtual tour

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

the added performance of high-speed I/O and the fastest blades.

Here are some fast BladeCenter H facts:

- Delivers high performance, energy efficiency, and versatility to run the most demanding applications in larger data centers

- Integrates new high-efficiency power supplies for leading energy efficiency

- Provides easy integration to promote innovation and help manage growth, complexity, and risk

- Protects your investment by being compatible with the entire IBM BladeCenter family

- Provides more than 12% greater performance per watt compared to the competition.

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 service planes for telecommunications equipment manufacturers and service providers.

Here are some quick BladeCenter HT chassis facts:

- BladeCenter HT chassis details on PartnerWorld
- BladeCenter HT chassis details on IBM.com
- BladeCenter HT chassis competitive info on COMP
- BladeCenter HT (8740) configuration details
- BladeCenter HT (8750) configuration details
- BladeCenter HT (8740) options
- BladeCenter HT (8750) options
- BladeCenter HT blog search
- BladeCenter HT Twitter search
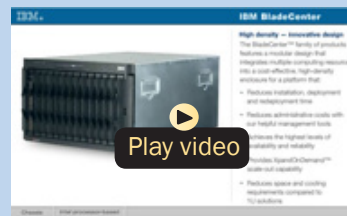
IBM BladeCenter HT virtual tour

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

- With a design that delivers investment protection, IBM BladeCenter HT integrates the server blades, switches, networking, storage, I/O, and management platforms that are supported across the BladeCenter family

- Network infrastructure costs may be reduced 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

- Network infrastructure performance is increased with dual-core and quad-core Intel, AMD, and IBM POWER processor blades

- High-speed connectivity and throughput are dramatically increased with multi-terabit networking (more than 1.2 Tbps throughput on backplane) and 40 Gbps per blade server

- Network flexibility and interoperability are improved by bridging new services to control gateways supporting SS7, VoIP, legacy PSTN, WAN devices, and network interfaces with special-purpose telecommunications blades

- Network resources are efficiently consolidated while high scalability for NGN applications such as IPTV, VoD, and IMS are delivered, with higher port concentrations and 10 Gbps Ethernet network bandwidth

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

- Certified testing by Underwriters Laboratories (UL) of the BladeCenter HT chassis is in progress, and when complete the BladeCenter HT chassis will be covered under a UL-certified NEBS Level 3/ETSI test report, which will be available for customer review

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

- Flexibility and choice are increased with a single family of compatible systems, designed for deployment in a telecom central office or data center environment.

Blade Servers

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

- x86 Blades—Intel Xeon and AMD Opteron blades

- POWER blades

- Cell/B.E. blades.

x86 Blades

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

HS12

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

Specifications

Processor (max)	Single- or Dual-Core Intel Xeon up to 3.0 GHz or Quad-Core Intel Xeon up to 2.83 GHz and up to 1333 MHz front-side bus
Number of processors (std/max)	1/1
Cache (max)	Up to 6 MB L2 shared (dual-core) or 2x6 MB L2 (quad-core)
Memory (max)	24 GB
Internal hard disk drives	Choice of hot-swap solid-state, hot-swap SAS, or non-hot-swap SATA HDDs (support for up to 3 hot-swap SAS drives with optional storage and I/O blade)
Maximum internal storage	293.6 GB
Network interface	Dual Gigabit Ethernet, up to 8 ports optional
I/O upgrade	1 PCI-Express expansion card connection and 1 PCI-Express high-speed connection
RAID support	Integrated RAID-0 or -1 standard on hot-swap models; optional hardware RAID-5 on SIO to protect critical data (select models)
Systems management	Integrated systems-management processor (BMC), UpdateXpress, Remote Deployment Manager, IBM Director, IBM Systems Director Active Energy Manager, ServerGuide 7.x, Scripting Toolkit 1.x
Operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise and IBM OS 4690
Limited warranty	1-year or 3-year customer-replaceable unit and on-site limited warranty

- HS12 details on PartnerWorld
- HS12 details on IBM.com
- HS12 competitive info on COMP
- HS12 (8028) configuration details
- HS12 (8028) options
- HS12 blog search
- HS12 Twitter search
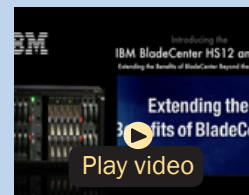
HS12 overview

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

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

Here are some quick HS12 facts:

- Provides similar performance, integration, and reliability as dual-processor servers, at a more affordable price point.

- Deploys quickly and manages tasks with no loss of uptime.

- Helps reduce power and cooling costs to boost data center efficiency.

HS22

The IBM BladeCenter HS22 (Figure H.2) offers flexible options to support a broad range of workloads, including virtualization and enterprise applications. Along with intuitive UEFI-based tools, the HS22 can be customized and deployed quickly while best-in-class reliability features help keep you up and running. Mix and match the HS22 with the industry's most diverse set of chassis and blades and that go beyond x86.

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

Specifications

Form factor	Single-wide (30 mm)
Processor (max)	Choice of 2 Intel Xeon 5600 series processors, up to 3.60 GHz
Number of processors (std/max)	1/2
Memory (max)	12 DDR-3 VLP DIMM slots (up to 192 GB of total memory capacity and memory speeds up to 1333 MHz) with memory sparing
Expansion slots	1 CIOv slot (standard PCIe daughter card) and 1 CFFh slot (high speed PCIe daughter card) for a total of 8 ports of I/O to each blade, including 4 ports of high-speed I/O
Disk bays (total/hot-swap)	2 hot-swap bays supporting SAS HDDs or solid-state drives
Maximum internal storage	Up to 1.0 TB total internal storage
Network interface	Virtual Fabric Adapter (10 GbE) ships integrated in some models Broadcom 5709S onboard NIC with dual Gigabit Ethernet ports with TOE
Hot-swap components	Internal storage bays
RAID support	RAID-0, -1 and -1E (optional RAID-5 with battery-backed cache)
Systems management	Unified Extensible Firmware Interface (UEFI), IBM Integrated Management Module (IMM), Predictive Failure Analysis, optional embedded hypervisor for virtualization, IBM Systems Director Active Energy Manager, light path diagnostics, IBM Systems Director and IBM ServerGuide
Operating systems	Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware, Oracle Solaris

- HS22 details on PartnerWorld
- HS22 details on IBM.com
- HS22 competitive info on COMP
- HS22 configuration details
- GPU Expansion Blade
- HS22 options
- HS22 blog search
- HS22 Twitter search

Figure H.2.   IBM BladeCenter HS22 at a glance (and links to more detail).

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

Select configurations of the HS22 are part of the IBM Express Advantage Portfolio designed to meet the needs of mid-size businesses. Easy to manage, Express models and configurations vary by country.

Here are some quick HS22 facts:

- Improve service with unparalleled RAS features and innovative management

- Reduce costs through increased performance, utilization, and efficiency

- Manage growth and reduce risk on a BladeCenter platform with proven stability.

HS22V

The IBM BladeCenter HS22V (Figure H.3) has been designed specifically for use in virtualized environments. With 18 DIMM slots supporting up to 288 GB of DDR3 memory, the HS22V allows you to fit more and larger virtual machines per blade. Durable solid-state drives and hardware RAID-0 and -1 provide outstanding reliability when virtualizing multiple workloads on a single blade. An embedded hypervisor enables easy deployment of industry-leading third-party virtualization solutions. Combine the HS22V with Virtual Fabric for IBM

Specifications

Form factor	Single-wide (30 mm)
Processor (max)	Choice of 2 Intel Xeon 5500 or 5600 series processors; supports advanced, standard, basic, and low voltage
Number of processors (std/max)	1/2
Cache (max)	At least 4 MB L3 cache (12 MB max)
Memory (max)	18 DDR-3 VLP DIMM slots (up to 288 GB of total memory capacity and memory speeds up to 1333 MHz) with memory sparing
Expansion slots	1 CIOv slot (standard PCIe daughter card) and 1 CFFh slot (high-speed PCIe daughter card) for a total of 8 ports of I/O to each blade, including 4 ports of high-speed I/O or 8 ports of virtual I/O using Virtual Fabric for IBM BladeCenter
Disk bays (total/hot-swap)	Up to two 1.8" solid-state drives (fixed)
Maximum internal storage	Up to 100 GB
Network interface	Virtual Fabric Adapter ships integrated in some models; Broadcom 5709S onboard NIC with dual Gigabit Ethernet ports with TOE
RAID support	RAID-0, -1, and -1E (optional RAID-5 with battery-backed cache)
Systems management	Unified Extensible Firmware Interface (UEFI), IBM Integrated Management Module, Predictive Failure Analysis, optional embedded hypervisor for virtualization, IBM Systems Director Active Energy Manager, light path diagnostics, IBM Systems Director, and IBM ServerGuide
Operating systems	Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware, Oracle Solaris
Limited warranty	3-year customer-replaceable unit and on-site limited warranty

- HS22V details on PartnerWorld
- HS22V details on IBM.com
- HS22V competitive info on COMP
- HS22V configuration details
- HS22V options
- HS22V blog search
- HS22V Twitter search

Play video

IBM BladeCenter Presents:
Very short demos with Ned. (0:25)

Figure H.3.   IBM BladeCenter HS22V at a glance (and links to more detail).

BladeCenter for a flexible, easy, fast, and reliable I/O solution that helps reduce cost and complexity.

The HS22V provides outstanding performance with support for the latest Intel Xeon processors, support for maximum memory capacity, fast memory throughput, and high-speed I/O.

The HS22V offers a flexible, energy-smart design. The HS22V supports up to two 1.8-inch solid-state drives that consume significantly less power than traditional spinning hard disk drives. New enhanced power management capabilities assist in power planning for the data center while IBM Systems Director Active Energy Manager provides tracking, monitoring and measuring of energy usage.

Select configurations of the HS22V are part of the IBM Express Advantage Portfolio designed to meet the needs of mid-size businesses. Easy to manage, Express models and configurations vary by country.

Here are some quick HS22V facts:

- Outstanding performance for virtualization with maximum memory capacity and CPU performance

- Improve service with unparalleled RAS features and innovative management

- Manage growth and reduce risk on a BladeCenter platform with proven stability.

HS23

The IBM BladeCenter HS23 (Figure H.4) gives you the networking capacity you need to manage big data. The new Virtual Fabric-capable integrated 10 GbE is scalable up to four

Specifications

Form factor	Single-wide (30 mm)
Processor (max)	Intel Xeon processor E5-2600 product family, with up to 8 cores, processing up to 16 simultaneous threads
Number of processors (std/max)	1/2
Cache (max)	20 MB
Memory (max)	256 GB at 1333 MHz (assuming 16 GB DIMMs), 16 DIMM sockets - VLP Registered ECC DDR3, at 1333 or 1600 MHz, memory mirroring and sparing supported
Expansion slots	1 CIOv slot (standard PCIe daughter cards) and 1 CFFh/CFFL slot (high-speed PCIe daughter card)
Disk bays (total/hot-swap)	2 hot-swappable HDDs or SSDs
Maximum internal storage	1 TB
Network interface	Integrated Virtual Fabric for BladeCenter, Emulex BE3 Dual 10 Gb/1 Gb
RAID support	RAID-0, -1 (optional RAID-5 with battery-backed cache)
Systems management	Unified Extensible Firmware Interface (UEFI), IBM Integrated Management Module, Predictive Failure Analysis, optional embedded hypervisor for virtualization, Systems Director Active Energy Manager, light path diagnostics, IBM Systems Director, IBM Server Guide, UpdateXpress, Dynamic System Analysis with Integrated RT Diagnostics, BladeCenter Open Fabric Manager
Operating systems	Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware
Limited warranty	3-year customer-replaceable unit and on-site limited warranty

- HS23 details on PartnerWorld
- HS23 details on IBM.com
- HS23 competitive info on COMP
- HS23 configuration details
- HS23 options
- Redbook: HS23 Product Guide
- HS23 blog search
- HS23 Twitter search

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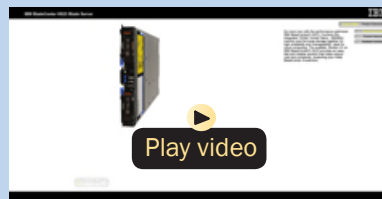
HS23 virtual tour

Figure H.4.   IBM BladeCenter HS23 at a glance (and links to more detail).

ports to offer extreme speed. Sixteen DIMM slots, supporting up to 256 GB of DDR3 memory, deliver more and larger virtual machines per blade compared to previous generations. Simplify deployment of infrastructure for faster time-to-value with IBM FastSetup.

The HS23 offers outstanding performance, with support for the new 8-core Intel Xeon processor E5-2600 product family that processes up to 16 simultaneous threads. It has fast memory throughput and integrated RAID-0, -1, with optional RAID-5 with a battery-backed cache.

The HS23 provides integrated 10 GbE capability, delivering increased high-speed performance and I/O flexibility, running multiple protocols (FCoE/iSCSI), and freeing your CFFh slot to do more. Choose from a variety of adapters to suit your data center needs.

The HS23 is designed to help you be smarter about energy usage. Not only does it support low-voltage processors and memory, but it also has built-in energy monitors that help save on energy costs and consumption.

You can combine the HS23 with the BladeCenter E chassis, the most dense chassis in the industry, to optimize efficiency and minimize power consumption.

Here are some quick HS23 facts:

- Provides outstanding performance with the latest Intel Xeon processor E5-2600 product family and 1600 MHz memory

- Integrated 10 Gigabit Ethernet (GbE) to gain flexibility and easy scalability

- Backward compatible with all existing BladeCenter chassis.

HX5

Going beyond the industry standards with unique innovations from fifth-generation IBM X-Architecture technology (eX5), the new IBM BladeCenter HX5 (Figure H.5) enables unprecedented performance and utilization in a blade form factor for database and virtualization. With MAX5 scalability, the HX5 blade offers memory capacity of up to 320 GB—in a double-wide blade. The result is optimal server utilization with more virtual machines per system and larger and faster databases.

With MAX5, HX5 offers the most memory of any server in its class. Reduce software license costs by expanding memory capacity with MAX5 without purchasing additional processors.

Easy to own, manage, and upgrade with pay-as-you-grow expansion, the HX5 blade server helps protect your investments over the long term. Capabilities such as advanced light path diagnostics, error handling, and around-the-clock remote access management help simplify systems management and minimize downtime. Automatic node failover and QPI faildown help promote greater system uptime.

Flexible configurations make it easy to implement the right system. Get up and running up to four times faster by standardizing on a single platform for two- and four socket server needs. Harness the MAX5 module to boost memory without adding processors or software license costs.

Here are some quick HX5 facts:

- Provide optimal performance for your demanding virtualization and database applications

- Reduce qualification time by standardizing on the same system for two- and four-socket server needs

Specifications

Form factor/height	Single-wide (30 mm), double-wide (60 mm)
Processor (max)	Intel Xeon E7-4800 and E7-2800 processors; 6/8/10 cores, up to 2.67 GHz; Up to 2 processors per single-wide HX5; scalable to 4 processors
Number of processors (std/max)	1/2 (scalable to 4)
Cache (max)	Up to 30 MB per processor (10 core)
Memory (max)	16 DDR-3 VLP DIMM slots, capacity up to 256 GB, per single-wide HX5 (scalable up to 640 GB max, at speeds up to 1067 MHz, via 40 DIMM slots, using a MAX5 expansion blade)
Expansion slots	1 CIOv slot (standard PCIe daughter card) and one CFFh slot (high-speed PCIe daughter card) for a total of eight ports of I/O to each blade, including four ports of high-speed I/O; scalable up to 16 ports of I/O in 4-socket, double-wide form factor
Disk bays (total/hot-swap)	2 non-hot-swap bays supporting solid-state drives per single-wide HX5
Maximum internal storage	Up to 100 GB of solid-state storage per single-wide HX5 (with 50 GB SSDs)
Network interface	Broadcom 5709S onboard NIC with dual Gigabit Ethernet ports with TOE
RAID support	Optional RAID-0, -1, -1E
Systems management	Integrated systems management processor
Operating systems	Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware, Oracle Solaris
Limited warranty	3-year customer replaceable unit and on-site limited warranty

- HX5 details on PartnerWorld
- HX5 details on IBM.com
- HX5 competitive info on COMP
- HX5 configuration details
- HX5 options
- HX5 blog search
- HX5 Twitter search
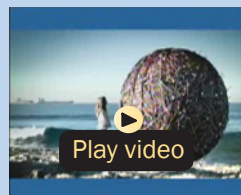
IBM BladeCenter viral video (1:15)

Figure H.5.   IBM BladeCenter HX5 at a glance (and links to more detail).

- Scale memory without adding CPUs or software licenses

- Get faster time to value by deploying workload-optimized systems.

POWER Blades

These blade servers use the IBM POWER family of processors.

PS700, PS701, and PS702 Express

The IBM BladeCenter PS700 (Figure J.1), PS701 (Figure J.2), and PS702 (Figure J.3) Express blade servers are built on the proven foundation of the IBM BladeCenter family of products—easy-to-use, integrated platforms with a high degree of deployment flexibility, energy efficiency, scalability, and manageability. They minimize complexity, improve efficiency, automate processes, reduce energy consumption, and scale easily: these are the benchmarks that matter on a smarter planet. They are the premier blades for 64-bit applications.

The POWER7 processor-based PS blades automatically optimize performance and capacity at either a system or virtual machine level and benefit from the new POWER7 processor, which contains innovative technologies that help maximize performance and optimize energy efficiency. They represent one of the most flexible and cost-efficient solutions for UNIX, i, and Linux deployments available in the market. Further enhanced by its ability to be installed in the same chassis with other IBM BladeCenter blade servers, the PS blades can deliver the rapid return on investment that clients and businesses demand.

PS702 PS700 PS701

Specifications

Form factor	Single-wide blade server for BladeCenter E, BladeCenter T, BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Four 64-bit 3.0 GHz POWER7 cores with AltiVec SIMD and Hardware Decimal Floating-Point acceleration
Level 2 (L2) cache	256 KB per processor core
Level 3 (L3) cache	4 MB per processor core
Memory (std/max)	Base offering: 8 GB (2 x 4 GB); Express offering: 16 GB (4 x 4 GB), up to 64 GB maximum per blade, 8 DIMM slots, ECC IBM Chipkill DDR3 SDRAM running at 1066 MHz (4 GB DIMMs) 800 MHz (8 GB DIMMs)
Internal disk storage	Two 300 or 600 GB 2.5" Serial Attached SCSI (SAS) 10K rpm non-hot-swappable disk drive; No disk drive required on base offering
Networking	Integrated Virtual Ethernet adapter (IVE) Dual Gigabit and support for optional dual-gigabit Ethernet
I/O upgrade	One PCI-E CIOv Expansion Card & one PCI-E CFFh High Speed Expansion Card
Optional connectivity	1 and 10 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion
PowerVM	PowerVM Express Edition: Includes Virtual I/O Server (VIOS) with Integrated Virtualization Manager and PowerVM Lx86; PowerVM Standard Edition: Adds shared processor pools and micropartitioning; PowerVM Enterprise Edition: Adds active memory sharing and live partition mobility
Systems management	Integrated systems management processor, IBM Systems Director Active Energy Manager, light path diagnostics, Predictive Failure Analysis, Cluster Systems Management (CSM), Serial Over LAN, IPMI compliant
Operating systems	AIX V5.3 or later, AIX V6.1 or later, IBM i 6.1 or later, SUSE Linux Enterprise Server 10 for POWER (SLES10 SP3) or later, SLES11 SP1 or later, Red Hat Enterprise Linux 5.5 for POWER (RHEL5.5) or later, RHEL5.1 or later
High availability	IBM PowerHA family

- PS700 Express details on PartnerWorld
- PS700 Express details on IBM.com
- PS700 Express competitive info on COMP
- PS700 blog search
- PS700 Twitter search

Play video
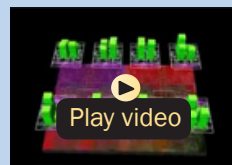
POWER7 Chip animation

Figure J.1.   IBM BladeCenter PS700 Express at a glance (and links to more detail).

Specifications

Form factor	Single-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Eight 64-bit 3.0 GHz POWER7 cores with AltiVec SIMD and Hardware Decimal Floating-Point acceleration
Level 2 (L2) cache	256 KB per processor core
Level 3 (L3) cache	4 MB per processor core
Memory (std/max)	Base offering: 16 GB (4 x 4 GB); Express offering: 32 GB (4 x 8 GB), up to 128 GB maximum per blade, 16 DIMM slots, ECC IBM Chipkill DDR3 SDRAM running at 1066 MHz (4 GB DIMMs) 800 MHz (8 GB DIMMs)
Internal disk storage	One 300 or 600 GB 2.5" Serial Attached SCSI (SAS) 10K rpm non-hot-swappable disk drive; No disk drive required on base offering
Networking	Integrated Virtual Ethernet adapter (IVE) Dual Gigabit and support for optional dual-gigabit Ethernet
I/O upgrade	One PCI-E CIOv Expansion Card and one PCI-E CFFh High Speed Expansion Card
Optional connectivity	1 and 10 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion
PowerVM	PowerVM Express Edition: Includes Virtual I/O Server (VIOS) with Integrated Virtualization Manager and PowerVM Lx86; PowerVM Standard Edition: Adds shared processor pools and micropartitioning; PowerVM Enterprise Edition: Adds active memory sharing and live partition mobility
Systems management	Integrated systems management processor, IBM Systems Director Active Energy Manager, light path diagnostics, Predictive Failure Analysis, Cluster Systems Management (CSM), Serial Over LAN, IPMI compliant
Operating systems	AIX V5.3 or later, AIX V6.1 or later; IBM i 6.1 or later; SUSE Linux Enterprise Server 10 for POWER (SLES10 SP3) or later; SLES11 SP1 or later; Red Hat Enterprise Linux 5.5 for POWER (RHEL5.5) or later; RHEL6.1 or later
High availability	IBM PowerHA family

- PS701 Express details on PartnerWorld
- PS701 Express details on IBM.com
- PS701 Express competitive info on COMP
- PS701 blog search
- PS701 Twitter search

✓ Minimize complexity
✓ Improve efficiency
✓ Scale easily

Play video

POWER7 Innovation

Figure J.2.   IBM BladeCenter PS701 Express at a glance (and links to more detail).

Specifications

Form factor	Double-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Sixteen 64-bit 3.0 GHz POWER7 cores with AltiVec SIMD and Hardware Decimal Floating-Point acceleration
Level 2 (L2) cache	256 KB per processor core
Level 3 (L3) cache	4 MB per processor core
Memory (std/max)	Base offering: 32 GB (8 x 4 GB); Express offering: 64 GB (16 x 4 GB), up to 128 GB maximum per blade, 16 DIMM slots, ECC IBM Chipkill DDR3 SDRAM running at 1066 MHz (4 GB DIMMs) 800 MHz (8 GB DIMMs)
Internal disk storage	Two 300 or 600 GB 2.5" Serial Attached SCSI (SAS) 10K rpm non-hot-swappable disk drive; No disk drive required on base offering.
Networking	Integrated Virtual Ethernet adapter (IVE) Dual Gigabit and support for optional dual-gigabit Ethernet
I/O upgrade	Two PCI-E CIOv Expansion Card & two PCI-E CFFh High Speed Expansion Card
Optional connectivity	1 and 10 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion
PowerVM	PowerVM Express Edition: Includes Virtual I/O Server (VIOS) with Integrated Virtualization Manager and PowerVM Lx86; PowerVM Standard Edition: Adds shared processor pools and micropartitioning; PowerVM Enterprise Edition: Adds active memory sharing and live partition mobility
Systems management	Integrated systems management processor, IBM Systems Director Active Energy Manager, light path diagnostics, Predictive Failure Analysis, Cluster Systems Management (CSM), Serial Over LAN, IPMI compliant
Operating systems	AIX V5.3 or later, AIX V6.1 or later; IBM i 6.1 or later; SUSE Linux Enterprise Server 10 for POWER (SLES10 SP3) or later; SLES11 SP1 or later; Red Hat Enterprise Linux 5.5 for POWER (RHEL5.5) or later; RHEL5.1 or later
High availability	IBM PowerHA family

- PS702 Express details on PartnerWorld
- PS702 Express details on IBM.com
- PS702 Express competitive info on COMP
- PS702 blog search
- PS702 Twitter search

Play video

POWER7 overview (German)

Figure J.3. IBM BladeCenter PS702 Express at a glance (and links to more detail).

Delivering on the promise for a highly dynamic infrastructure, the BladeCenter PS blades help in delivering superior business and IT services with agility and speed—all in a simple to manage highly efficient way. The PS700, PS701, and PS702 Express blades have been preconfigured and tested by IBM and are based on proven technology. Utilizing a 3.0 GHz 64-bit POWER7 processor and available in a four-core, eight-core, or sixteen-core configuration, they are optimized to achieve maximum performance for both the system and its virtual machines. Couple that performance with PowerVM and you are now enabled for massive workload consolidation to drive maximum system utilization, predictable performance, and cost efficiency.

Here are some quick PS700/701/702 facts:

- Consolidate on IBM BladeCenter Power Blades and virtualize applications to better utilize resources and amplify the already-significant advantages of BladeCenter efficiencies.

- Simplifies your deployment with flexible configurations that make it easy to implement the right system and the ability to run AIX, IBM i, and Linux operating systems simultaneously.

- Elegantly simple scalability, allows easy expansion and pay-as-you-grow flexibility for the utmost in investment protection, performance growth, and time to value.

- A secure, resilient infrastructure solution that helps drive cost down, reduces risk, improves energy efficiency, and enhances flexibility.

PS703 and PS704 Express

The IBM BladeCenter PS703 (Figure J.4) and PS704 (Figure J.5) Express are the premier blades for 64-bit applications. Minimize complexity, improve efficiency, automate processes, reduce energy consumption, and scale easily: these are the benchmarks that matter on a smarter planet. The new POWER7 processor-based PS blades automatically optimize performance and capacity at either a system or virtual machine level and benefit from the new POWER7 processor, which contains innovative technologies that help maximize performance and optimize energy efficiency. They represent one of the most flexible and cost-efficient solutions for UNIX, i, and Linux deployments available in the market. Further enhanced by their ability to be installed in the same chassis with other IBM BladeCenter blade servers, the PS blades can deliver the rapid return on investment that clients and businesses demand.

Delivering on the promise for a highly dynamic infrastructure, the BladeCenter PS blades help in delivering superior business and IT services with agility and speed—all in a simple to manage highly efficient way. The PS703 and PS704 Express blades have been preconfigured and tested by IBM and are based on proven technology. Utilizing a 2.4 GHz 64-bit POWER7 processor and available in 16-core or 32-core configuration, they are optimized to achieve maximum performance for both the system and its virtual machines. Couple that performance with PowerVM and you are now enabled for massive workload consolidation to drive maximum system utilization, predictable performance, and cost efficiency.

Here are some quick PS703/704 facts:

Specifications

Form factor	Single-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Sixteen 64-bit 2.4 GHz POWER7 cores with AltiVec SIMD and Hardware Decimal Floating-Point acceleration
Level 2 (L2) cache	256 KB per processor core
Level 3 (L3) cache	4 MB per processor core
Memory (std/max)	Base offering: 16 GB (4 × 4 GB); Express offering: 32 GB (4 × 8 GB), up to 128 GB maximum per blade, 16 DIMM slots, ECC IBM Chipkill DDR3 SDRAM running at 1066 MHz (4 GB DIMMs) 1066 MHz (8 GB DIMMs)
Internal disk storage	One 300 or 600 GB 2.5" Serial Attached SCSI (SAS) 10K rpm non-hot-swappable disk drive or two 1.8" 177 GB Solid State Disks; No disk drive required on base offering
Networking	Integrated dual gigabit Ethernet ports; Virtualized ethernet provided by PowerVM VIOS
I/O upgrade	One PCI-E CIOv Expansion Card and one PCI-E CFFh High Speed Expansion Card
Optional connectivity	1 and 10 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion
PowerVM	PowerVM Express Edition: Supports 2 VMs/server and includes Virtual I/O Server (VIOS) and PowerVM Lx86 PowerVM Standard Edition: Scales to 10 VMs/core and adds suspend/resume and shared storage pools PowerVM Enterprise Edition: Adds active memory sharing and live partition mobility
Operating systems	AIX V5.3, V6.1, or AIX 7.1; IBM i 7.1 or 6.1.1; SUSE Linux Enterprise Server SLES11 SP1 or later; Red Hat Enterprise Linux 5.6 for POWER or later; RHEL6.0 or later
High availability	IBM PowerHA family

- PS703 Express details on PartnerWorld
- PS703 Express details on IBM.com
- PS703 Express competitive info on COMP
- PS703 blog search
- PS703 Twitter search

Play video

BladeCenter PS703 virtual tour

Figure J.4.   IBM BladeCenter H with PS Blades, PS703 Express at a glance (and links to more detail).

Specifications

Form factor	Double-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT chassis
Processor cores	Thirty two 64-bit 2.4 GHz POWER7 cores with AltiVec SIMD and Hardware Decimal Floating-Point acceleration
Level 2 (L2) cache	256 KB per processor core
Level 3 (L3) cache	4 MB per processor core
Memory (std/max)	Base offering: 32 GB (8 x 4 GB); Express offering: 64 GB (8 x 8 GB), up to 256 GB maximum, 32 DIMM slots, ECC IBM Chipkill DDR3 SDRAM running at 1066 MHz (4 GB DIMMs) 1066 MHz (8 GB DIMMs)
Internal disk storage	Two 300 or 600 GB GB 2.5" Serial Attached SCSI (SAS) 10 K rpm non-hot-swappable disk drive or four 1.8" 177 GB Solid State Disks; No disk drive required on base offering
Networking	Integrated quad gigabit Ethernet ports; Virtualized ethernet provided by PowerVM VIOS
I/O upgrade	Two PCI-E CIOv Expansion Cards and two PCI-E CFFh High Speed Expansion Cards
Optional connectivity	1 and 10 Gbps Ethernet, 4 and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion
PowerVM	PowerVM Express Edition: Supports 2 VMs/server and includes Virtual I/O Server (VIOS) and PowerVM Lx86 PowerVM Standard Edition: Scales to 10 VMs/core and adds suspend/resume and shared storage pools PowerVM Enterprise Edition: Adds active memory sharing and live partition mobility
Operating systems	AIX V5.3, V6.1, or AIX 7.1; IBM i 7.1 or 6.1.1; SUSE Linux Enterprise Server SLES11 SP1 or later; Red Hat Enterprise Linux 5.6 for POWER or later; RHEL6.0 or later
High availability	IBM PowerHA family

- PS704 Express details on PartnerWorld
- PS704 Express details on IBM.com
- PS704 Express competitive info on COMP
- PS704 blog search
- PS704 Twitter search

Figure J.5.   IBM BladeCenter PS704 Express at a glance (and links to more detail).

- Consolidate on IBM BladeCenter PowerBlades and virtualize applications to better utilize resources and amplify the already-significant advantages of BladeCenter efficiencies

- Simplifies your deployment with flexible configurations that make it easy to implement the right system and the ability to run AIX, IBMi, and Linux operating systems simultaneously

- Realize innovation with a flexible, scalable architecture that lets you choose the right solution for your dynamic business and delivers the utmost in investment protection, performance growth, and time to value

- A secure, resilient infrastructure solution that helps drive down costs, reduce risk, improve energy efficiency, and enhance flexibility.

JS12 Express

The IBM BladeCenter JS12 Express blade server (Figure J.6) is the perfect alternative to a traditional AIX, IBM i, or Linux rack-mount or tower server. The JS12 Express bladeserver, combined with a BladeCenter S chassis, provides exceptional value and expandability in an attractively packaged and highly efficient design. And, specifically for an office environment, this combination can reside in your office quietly, securely, and looking like it belongs with an acoustic treatment for quiet operation, a set of security doors to protect vital data and servers, and optional dust filtering to expand IT into virtually any environment. For small database and application serving, the BladeCenter JS12 Express blade server delivers great performance, expandability, and capacity to satisfy the needs

Specifications

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

- JS12 Express details on PartnerWorld
- JS12 Express details on IBM.com
- JS12 Express competitive info on COMP
- JS12 blog search
- JS12 Twitter search
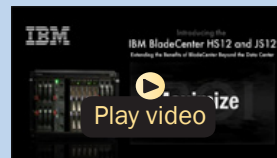
JS12 overview

Figure J.6.   IBM BladeCenter JS12 Express at a glance (and links to more detail).

of clients looking for an easy-to-use, integrated platform with a high degree of deployment flexibility, scalability, and manageability.

Here are some quick JS12 facts:

- For replacing traditional UNIX, IBM i (formerly known as i5/OS) and Linux servers

- For small database and application serving

- For a complete business system with an integrated database and application server.

Cell/B.E. Blades

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

In this section we examine blade servers based on the Cell/B.E. processor designed to meet these needs by comple-

menting systems based on traditional processors to accelerate parallel processing and streaming applications.

QS22

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

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

Here are some quick QS22 facts:

- Third-generation blade system based on an enhanced version of the Cell Broadband Engine Architecture

- IBM PowerXCell 8i processor, offering five times the double-precision performance of the previous Cell/B.E. processor

Specifications

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

- QS22 details on PartnerWorld
- QS22 details on IBM.com
- QS22 competitive info on COMP
- QS22 blog search
- QS22 Twitter search

Play video
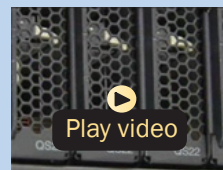
QS22 commercial supercomputing (1:45)

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

- High-performance blade solution for selected workloads

- Significant performance acceleration of target workloads such as rendering and medical imaging

- Up to 32 GB of processor memory.

BladeCenter Open Fabric (I/O)

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

> **MORE ON THE WEB**
>
> - BladeCenter Open Fabric info on IBM.com

business. Integrated across all blades, switches, and chassis, BladeCenter Open Fabric supports open standards and industry interoperability across five I/O fabrics, including Fibre Channel, InfiniBand, Ethernet, iSCSI, and serial attached SCSI (SAS), helping to simplify blade I/O management and deployment so you can concentrate on realizing innovation in your business.

BladeCenter Open Fabric Manager

IBM BladeCenter Open Fabric Manager is designed to help you manage growth and complexity by making it easy to manage I/O and network interconnects for up to 100 BladeCenter chassis—up to 1400 blade servers. BladeCenter Open Fabric Manager helps make blade deployment EASY: Once installed, the utility is resident in the Advanced Man-

agement Module (AMM) so you can preconfigure LAN and SAN connections. Thus, I/O connections are made automatically when you plug in a blade. And no special tools or training are required; just manage with the easy-to-use GUI. Clients can also purchase the optional Advanced version which enables automatic failover to a predefined spare blade pool, thereby maintaining a high-availability environment for mission-critical applications.

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

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

MORE ON THE WEB

- BladeCenter Open Fabric Manager info on IBM
- BladeCenter Open Fabric Manager competitive info on COMP
- BladeCenter Open Fabric Manager blog search
- BladeCenter Open Fabric Manager Twitter search
- BladeCenter Open Fabric Manager on YouTube (multiple videos)

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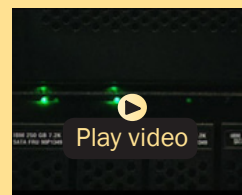
IBM BladeCenter Open Fabric Manager (Alex Yost) (4:50)

Virtual Fabric

As the deployment of server virtualization technologies becomes more prevalent within data centers, more dynamic performance is needed to provide sufficient network I/O bandwidth to satisfy these demands. With Virtual Fabric, IBM can help you break the I/O bottleneck by allowing you to allocate bandwidth where needed, delivering maximum

> **MORE ON THE WEB**
>
> • Virtual Fabric info on IBM.com

application agility. Offering a full range of virtualization and convergence capabilities, the same network hardware can act as Ethernet, iSCSI, or FCoE, and bandwidth can be allocated in increments from 100 Mb to 1 Gb. Choose the Emulex adapter and IBM System Networking BNT switch for advanced virtualization capabilities leveraging IBM Networking OS (BLADEOS) to carve up virtual pipes between the adapter and switch, or combine the Broadcom adapter with either of our Brocade or Cisco 10 Gb switches for general-purpose virtual fabric capabilities.

Here are some overall virtual fabric highlights:

- Full range of capabilities including Ethernet, iSCSI, and FCoE

- Virtualize any 10 Gb switch supporting multiple protocols through the switch-independent Virtual Fabric

- Quadruple the number of adapters by server, while reducing switch modules

- Get up to 8 virtual ports operating anywhere between 100 Mb and 10 Gb

- Benefit from true line-rate 10 Gb performance.

Now let's look at some specific virtual fabric offerings for IBM BladeCenter.

IBM BNT Virtual Fabric 10 Gb Switch Module

The IBM System Networking BNT Virtual Fabric 10 Gb Switch Module for IBM BladeCenter offers the most bandwidth of any blade switch and represents the perfect

> **MORE ON THE WEB**
>
> - BNT Virtual Fabric 10 Gb Switch Module Redbook info
> - BNT Virtual Fabric 10 Gb Switch Module info on PartnerWorld

migration platform for clients who are still at 1 Gb outside the chassis by seamlessly integrating in the existing 1 Gb infrastructure. This is the first 10 Gb switch for IBM BladeCenter that is convergence ready—able to transmit Converged Enhanced Ethernet (CEE) to a Fibre Channel over Ethernet (FCoE) capable top-of-rack switch. This feature will be available through a future firmware upgrade at no additional cost.

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

Here are some quick BNT Virtual Fabric 10 Gb Switch Module facts:

- Single-wide high-speed switch module

- Fourteen internal auto-negotiating ports: 1 Gb or 10 Gb to the server blades

- Two internal full-duplex 100 Mbps ports connected to the management module
- Up to ten 10 Gb SFP+ ports (also designed to support 1 Gb SFP if required, flexibility of mixing 1 Gb/10 Gb)
- One 10/100/1000 Mb copper RJ-45 used for management or data
- Supports IBM Virtual Fabric for IBM BladeCenter
- Supports IBM Virtual Fabric for IBM BladeCenter with advanced functionality
- VMready brings VM awareness to the network for improved VM mobility
- Stacking support.

QLogic Virtual Fabric Extension Module

IBM was among the first to deliver Fibre Channel over Ethernet across System x and BladeCenter, and this new module takes this a step further by offering clients I/O

> **MORE ON THE WEB**
>
> - QLogic Virtual Fabric Extension Module Redbook info
> - QLogic Virtual Fabric Extension Module info on PartnerWorld

convergence inside the chassis. Clients using the IBM BNT 10-port 10 Gb Ethernet Switch Module for their LAN traffic can now combine it with this module and a Converged Network Adapter such as the QLogic 2-port 10 Gb CNA to converge their LAN and SAN on a single network.

Emulex 10 GbE Virtual Fabric Adapter II/Advanced II

The Emulex 10 GbE Virtual Fabric Adapter II and Emulex 10 GbE Virtual Fabric Adapter Advanced II are enhancements to the existing IBM BladeCenter Virtual Fabric portfolio. These adapters allow IBM clients to simplify their I/O infrastructure by reducing the number of switches needed inside the chassis. The Emulex 10 GbE Virtual Fabric

MORE ON THE WEB
• Emulex 10 GbE Virtual Fabric Adapter II Redbook info
• Emulex 10 GbE Virtual Fabric Adapter II info on PartnerWorld

Adapter II is a dual-port 10 Gb Ethernet card that supports 1 Gbps or 10 Gbps traffic, or up to eight virtual NIC (vNIC) devices.

The virtual NICs are configured to meet the client's mix of network connectivity and throughput demands for today's complex server application environments. Each physical 10 Gbps port can be divided into four virtual ports with bandwidth allocation in 100 Mbps increments to the maximum 10 Gbps per physical port. The Emulex 10 GbE Virtual Fabric Adapter II Advanced adds FCoE and iSCSI hardware initiator functionality.

The Emulex 10 GbE Virtual Fabric Adapter II supports the BNT Virtual Fabric 10 Gb Switch Module in IBM Virtual Fabric Mode. A firmware update is planned that will enable this card to function in Switch Independent Mode with other IBM BladeCenter 10 GbE switch offerings from Cisco and Brocade, and the 10 Gb Ethernet Pass-Thru Module for IBM BladeCenter.

Emulex 10 GbE Virtual Fabric Adapter/Advanced

The Emulex 10 GbE Virtual Fabric Adapter for IBM BladeCenter is a dual-port 10 Gb Ethernet card that supports 1 Gbps or 10 Gbps traffic, or up to eight virtual NIC devices.

> **MORE ON THE WEB**
>
> - Emulex 10 GbE Virtual Fabric Adapter Redbook info
> - Emulex 10 GbE Virtual Fabric Adapter info on PartnerWorld

The virtual NICs are configured to meet the client's mix of network connectivity and throughput demands for today's complex server application environments.

Brocade Converged 10 GbE Switch Module

The Brocade Converged 10 GbE Switch Module and Brocade 2-Port 10 Gb Converged Network Adapter are part of a leading Converged Ethernet solution for IBM BladeCenter that offers Fibre Channel investment protection, maximum bandwidth and performance, and simplicity in a converged environment. The Brocade Converged 10 GbE Switch Module

> **MORE ON THE WEB**
>
> - Brocade Converged 10 GbE Switch Module Redbook info
> - Brocade Converged 10 GbE Switch Module info on PartnerWorld
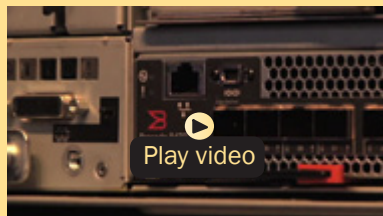
Brocade Converged 10 GbE Switch Module overview (2:43)

also features Dynamic Ports on Demand capability through the Port Upgrade Key. This capability allows you to enable any combination of Fibre Channel and Ethernet ports based on your infrastructure requirements, and to experience Converged Ethernet benefits without significant investment.

Broadcom 2-port 10 Gb Virtual Fabric Adapter

The Broadcom 2-port 10 Gb Virtual Fabric Adapter for IBM BladeCenter is a part of IBM's comprehensive networking portfolio of 1 GbE and 10 GbE adapters and delivers industry-leading performance and scalability per watt, reducing requirements for power and cooling. Protocol offloads enable efficient use of computing resources, support more virtual machines per CPU, and reduce the number of servers required to support data center demands. These adapters allow IBM clients to simplify their I/O infrastructure by reducing the number of switches needed inside the chassis.

MORE ON THE WEB

- Brocade 2-port 10 Gb Virtual Fabric Adapter Redbook info
- Broadcom 2-port 10 Gb Virtual Fabric Adapter info on PartnerWorld

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Broadcom 10 Gb (Gen 2) 2-port and 4-port Ethernet Expansion Cards

The Emulex 10 GbE Virtual Fabric Adapter for IBM BladeCenter is a dual-port 10 Gb Ethernet card that supports 1 Gbps or 10 Gbps traffic, or up to eight virtual NIC devices. The virtual NICs are configured to meet the client's mix of network con-

MORE ON THE WEB

- Brocade 10 Gb Gen 2 2/4 port Ethernet Expansion Card Redbook info
- Brocade 10 Gb Gen 2 2/4 port Ethernet Expansion Card info on PartnerWorld

nectivity and throughput demands for today's complex server application environments. Each physical 10 Gbps port can be divided into four virtual ports with bandwidth allocation in 100 Mbps increments to the maximum 10 Gbps per physical port. The Emulex 10 GbE Virtual Fabric Adapter Advanced adds iSCSI hardware initiator functionality.

Ethernet Switch Modules

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

10 Gb Ethernet Pass-Thru Module

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

MORE ON THE WEB

- 10 Gb Ethernet Pass-Thru Module Redbook
- 10 Gb Ethernet Pass-Thru Module info on PartnerWorld
- Ethernet I/O info on IBM.com

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

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

- Single-wide high-speed switch module

- Fourteen internal 10 Gb ports to the server blades (no auto-negotiation)

- Up to fourteen 10 Gb SFP+ uplink ports (SFP+ modules not included)

- Support for SR, LR, and DAC copper cables

- Direct one-to-one mappings of external and internal ports (no configuration required).

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

The IBM System Networking BNT Layer 2/3 Switch offers all the switching features in a BladeCenter chassis at a competitive price. This switch is offered in two versions: Copper and

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MORE ON THE WEB

- BNT Layer 2/3 Copper/Fiber Gigabit Ethernet Switch Module Redbook info
- BNT Layer 2/3 Copper/Fiber Gigabit Ethernet Switch Module info on PartnerWorld
- Ethernet I/O info on IBM.com

Fiber. These versions provide reliability and flexibility and meet all the stringent requirements of both enterprise and telecom environments.

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

- Fourteen internal full-duplex Gigabit ports

- Two internal full-duplex 10/100 Mbps ports

- Copper switch: Six 1000BASE-T copper RJ-45 connections

- Fiber switch: Six 1000BASE-SX SFP transceiver-based LC fiber connections

- Autosensing 10/1000/1000 Mbps external Ethernet ports for bandwidth optimization

- Nonblocking architecture with wire-speed forwarding of traffic.

IBM BNT Layer 2-7 Gigabit Ethernet Switch Module

BLADE Network Technologies (BNT) offers a Layer 2-7 Gigabit Ethernet Switch Module, which enables you to consolidate full Layer 2-7 LAN switching capabilities into IBM BladeCenter. Consolidation flattens the topology of the data center infrastructure and reduces the number of discrete devices, man-

MORE ON THE WEBv

- BNT Layer 2-7 Gigabit Ethernet Switch Module info on PartnerWorld
- Ethernet I/O info on IBM.com

agement consoles, and manufacturers that you have to deal with. And the L2-7 Switch Module includes advanced security, high availability, and performance features, further reducing the need for discrete function-specific appliances. The result is dramatic simplification of the data center infrastructure, which translates into faster performance, higher availability, greater scalability, stronger security, simplified management, and lower TCO.

Here are some quick BNT Layer 2-7 facts:

- Improved application availability and boosted application performance

- Increased application and server scalability

- Enhanced application and server security

- Simplified server deployment and management

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

Cisco Catalyst Switch Module 3012

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

> **MORE ON THE WEB**
>
> - Cisco Catalyst Switch Module 3012 info on PartnerWorld
> - Cisco Catalyst Switch Module 3012 info on IBM.com
> - Ethernet I/O info on IBM.com

Cisco hardware and Cisco IOS Software, the Cisco Catalyst Switch Module 3012 is engineered with unique technologies

specifically designed to meet the rigors of blade server–based application infrastructure for the small or mid-size enterprise. Here are some quick 3012 facts:

- Cisco Catalyst Switch Module 3012 provides four external 1 Gb ports and 14 internal 1 Gb ports

- Operates in a standard I/O module bay across all chassis types

- Cisco Catalyst Switch Module 3012 is fully compatible with Open Fabric Manager—enabled for I/O virtualization with no changes required in switch module during installation or after blade replacement or failover

- Layer 2 and basic Layer 3 switching (static routing and RIP) is supported

- Cisco Catalyst Switch Module 3012 offers common management with external Cisco switches via IOS Command Line Interface and CiscoWorks LAN Management Solution.

Cisco Catalyst Switch Modules 3110G and 3110X

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

Here are some quick 3110G and 3110X facts:

- Cisco Catalyst Switch Module 3110G provides four external 1 Gb ports and 14 internal 1 Gb ports

- Cisco Catalyst Switch Module 3110X provides one external 10 Gb uplink port and 14 internal 1 Gb ports

- Both are perfect for large enterprises where Cisco's VBS technology enables rack-level link consolidation and switch management

- Both are fully compatible with Open Fabric Manager—enabled for I/O virtualization with no changes required in switch module during installation or after server blade replacement or failover

- The base switch supports Layer 2 and basic Layer 3 switching; IP Services S/W upgrade enables OSPF and BGP routing; Advanced I/P Services S/W upgrade enables IPv6n

- Cisco Catalyst Switch Module 3110G and Module 3110X operate in standard I/O module bay across BladeCenter E, H, T, and HT chassis types

- Separately available are two optional S/W keys for the Cisco Catalyst 3110 switch modules.

Intelligent Copper Pass-Thru Module

The Intelligent Copper Pass-Thru Module (ICPM) is designed for those IT organizations that wish to deploy their IBM BladeCenter servers directly into their existing networking infrastructure and that require line rate performance. The ICPM provides many additional functions not available on the older IBM Copper Pass-Thru Module (CPM) and is supported

> **MORE ON THE WEB**
>
> - Copper Pass-Thru info on PartnerWorld
> - Ethernet I/O info on IBM.com

in all BladeCenter chassis and the Multi-Switch Interconnect Module (MSIM). The ICPM is designed to exploit management capabilities of the management modules or advanced management modules (MM/AMM).

The moment a cable is plugged into the uplink ports of the ICPM and the upstream switch, the ICPM automatically negotiates the best connection to the upstream switch with no further action required. Unlike the older IBM CPM, which used fan-out cables that were limited 3-meter lengths, the ICPM is designed to use standard Ethernet cables with lengths up to 100 meters to connect to upstream networking equipment. And instead of using three fan-out cables, the ICPM's uplink ports use 14 separate Ethernet cables, which reduces the impact of any single cable failure.

Here are some quick Intelligent Copper Pass-Thru Module facts:

- Ideal for clients whose applications require 100 percent line rate performance

- Easy to install and does not require any networking knowledge

- Compatible with Serial over LAN (SoL) and secure Concurrent KVM

- Fully compatible with BladeCenter Open Fabric Manager.

IBM BNT 1/10 Gb Uplink Ethernet Switch Module

The IBM System Networking's BNT 1/10 Gb Uplink Ethernet Switch Module for IBM BladeCenter is an innovative switch designed to meet the growing bandwidth needs of our clients. Today, while our clients look to implement solu-

> **MORE ON THE WEB**
>
> - IBM BNT 1/10 Gb Ethernet Switch info on PartnerWorld
> - Ethernet I/O info on IBM.com

tions to meet their current 1 Gb requirements, they also need a way to migrate easily to 10 Gb. This switch provides investment protection and future proofing since it supports both 1 Gb and 10 Gb ports concurrently. This is a major advantage verse the Cisco offerings since you get both 1 Gb and 10 Gb uplinks in a single switch no need for rip and replace, plus a seamless transition from 1 Gb to 10 Gb with no downtime

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

- Includes six 1 Gb and three 10 Gb Ethernet Uplinks for unmatched upstream bandwidth (all can be active at once)

- Supported in all five IBM BladeCenter chassis in addition to Multi-Switch Interconnect Module (MSIM) for IBM BladeCenter and IBM BladeCenter HT

- Designed for extreme lower-power consumption

- Full Ethernet Layer 2/3 functionality comes standard.

- Support for VMready making the network VM aware and simplifying VM mobility

- Stacking support.

Server Connectivity Module for IBM BladeCenter

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

MORE ON THE WEB

- Server Connectivity Module for IBM BladeCenter info on PartnerWorld
- Ethernet I/O info on IBM.com

Here are some quick facts about this module:

- Serves the needs of small and mid-size business customers

- Easy to install, configure, and manage through an easy-to-use browser-based interface

- Ideal for environments where a separation between the server and networking domains is preferred.

Cisco Nexus 4001I Switch Module for IBM BladeCenter

The Cisco Nexus 4001I Switch Module for IBM BladeCenter is an end-to-end 10 Gb switch that offers a high-performance, low-latency solution that seamlessly integrates with other Cisco Nexus family products. An optional upgrade license key enables easy transition to FCoE. Clients considering Fibre Channel over Ethernet as a fabric-consolidation solution can implement a 10 Gb Ethernet infrastructure as the basis of the solution. The solution uses FCoE between the converged network

MORE ON THE WEB
• Cisco Nexus 4001I info on PartnerWorld
• Cisco Nexus 4001I info on IBM.com
• Cisco Nexus 4001I Redbook

adapter (CNA) in each server and a top-of-rack (TOR) switch such as the Cisco Nexus 5000 Series, with the Cisco Nexus 4001I blade switch at the access layer between them.

With this solution, clients gain most of the cost savings from the use of fewer adapters, cables, and switch ports. The FCoE connection between the CNA and the 4001I and 5000 Series switches will carry both Fibre Channel and Ethernet traffic on a single link. The Cisco Nexus 5000 Series switch

will then separate LAN and Ethernet traffic to the Cisco Nexus 7000 Series switch upstream and SAN traffic to the Cisco MDS 9000 Family switch upstream.

Here are some quick facts about this module:

- Twenty ports of 10 Gb (14 internal and 6 external) bandwidth

- Supported on High Speed Chassis (H/HT), all multi-switch interconnect modules and compatible with BladeCenter Open Fabric Manager

- Common Nexus CLI and Web-based management tool.

Fibre Channel Switch Modules

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

Cisco 4 Gb 10- and 20-port Fibre Channel

These latest Fibre Channel switching options integrate an enterprise fabric into the BladeCenter architecture, providing high-bandwidth connectivity. They offer high-performance, highly available storage area networks (SANs) at a competitive price, and are easy to set up and integrate into core or edge SAN configurations.

MORE ON THE WEB

- Cisco 4 Gb 10 and 20-port Fibre Channel Switch info on PartnerWorld
- Cisco 4 Gb 10 and 20-port Fibre Channel Switch info on IBM.com

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

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

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

- Exciting addition to the Cisco Ethernet and MDS family of products

- Includes Tivoli SAN manager enhancements to better manage MDS9000 with integrated IBM SAN Volume Controller

- Ten-port upgrade available for on-demand scaling to a 20-port switch

- Cisco SFPs are required:
  - Long-wave 41Y8600
  - Short-wave 41Y8598
  - Short-wave 4-pack 41Y8596.

Brocade 10- and 20-port 8 Gbps SAN Switch Modules

The Brocade Enterprise 10-port and 20-port 8 Gbps SAN Switch Modules for IBM BladeCenter deliver embedded Fibre Channel switching with the industry's fastest Fibre Channel throughput performance (8 Gb). These two switches have almost the same features and functions except for the number of activated ports: the 10-port switch has 10 activated ports, and the 20-port switch has 20 activated ports.

Here are some quick Brocade 8 Gbps SAN Switch facts:

- Six external auto-sensing Fibre Channel ports (2 Gbps, 4 Gbps, or 8 Gbps for 8 Gb SFP+ transceivers) operate at a maximum speed of 8 Gbps

- Fourteen internal Fibre Channel ports operate as F_ports (fabric ports) at 2 Gbps, 4 Gbps, or 8 Gbps, depending on FC expansion cards installed into blades

- Ten-port model with 10 Dynamic Ports-On-Demand (DPODs) can be activated in any combination of internal and external ports.

- High-availability features include hot-pluggable design, non-disruptive software upgrades, automatic path failover, and power-on self-test diagnostics and status reporting

- Aggregate Fibre Channel I/O bandwidth: 48 Gbps (6 external ports at 8 Gbps line rate)

- External ports can operate as F_ports (fabric ports), FL_ports (fabric loop ports), or E_ports (expansion ports) when in full FC switch mode; when in Brocade Access Gateway mode, the external ports operate as NPIV-enabled N_Ports

- Fabric latency of 0.74 µsec ensures the fastest response and access time to data for critical applications and servers

- Full 8 Gbps operations are supported at distances up to 129 km and up to 1036 km at 1 Gbps.

QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module

The QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module for IBM BladeCenter provides double the throughput of the 4 Gb module described above. It provides an alternative to the traditional optical pass-thru module with six external 8 Gb ports. It is supported across all BladeCenter chassis and multi-switch interconnect modules.

MORE ON THE WEB

- QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module info on PartnerWorld
- Fibre Channel Switch info on IBM.com

QLogic 20-port 8 Gb SAN Switch Module

The QLogic 20-port 8 Gb SAN Switch Module for IBM BladeCenter offers double the throughput of the 4 Gb version described above. It enables high-performance 2, 4, and 8 gigabits-per-second SAN solutions and provides interoperability in open mode leveraging standards-compliant (FC-SW2

MORE ON THE WEB

- QLogic 20-port 8 Gb SAN Switch Module info on PartnerWorld
- Fibre Channel Switch info on IBM.com

& FC-SW3) SANs. This 20-port switch module is supported on BladeCenter E, H, T, and HT chassis and multi-switch interconnect modules.

InfiniBand Switch Modules

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

Voltaire 40 Gb InfiniBand Switch Module

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

> **MORE ON THE WEB**
>
> • Voltaire 40 Gb InfiniBand Switch Redbook Technote
> • Voltaire 40 Gb InfiniBand Switch info on PartnerWorld

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

The InfiniBand Switch Module offers 14 Gb ports, one to each server, and 16 ports out of the chassis per switch. This

solution offers a no-compromise, congestion-free solution to meet even the most performance-hungry applications.

Here are some quick Voltaire 40 Gb InfiniBand Switch facts:

- Full QDR rate InfiniBand switching

- Based on the Infiniscale-IV device

- Up to 40 Gbps performance for clusters and grids (bidirectional)

- Hot-swap support, with soft start and current limiting

- Bay address and presence support.

SAS I/O

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

BladeCenter S SAS RAID Controller Module

IBM BladeCenter is the industry's premier server portfolio, and it has been helping clients simplify IT, making it easier to deploy, own, and manage servers, storage, and IO. IBM is ex-

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MORE ON THE WEB

- BladeCenter S SAS RAID Controller Module info on PartnerWorld
- BladeCenter S SAS RAID Controller Module info on IBM.com

tending that promise by making available the IBM BladeCenter S SAS RAID Controller Module. Quite simply, the SAS RAID Controller Module can enable the benefits of a SAN right inside the BladeCenter S chassis.

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

Here are some quick SAS RAID Controller Module facts:

- Enhanced domain knowledge and function in Microsoft application monitors

- Improved problem determination by combining data from multiple Microsoft application monitors

- Automated Microsoft business practices

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

SAS Connectivity Module

The IBM BladeCenter SAS Connectivity Module is a high-performance 3 Gbps SAS based pass-thru module that enables broad storage functionality for all BladeCenter chassis.

Here are some quick SAS Connectivity Module facts:

- Enables up to twelve 3.5-inch SAS or SATA disks in BladeCenter S using the Disk Storage Module (DSM)

- Enables use of entry storage products such as IBM System Storage DS3200 with BladeCenter chassis

- Two switches to enable fully redundant capability in BladeCenter chassis

- High-performance, fully duplex, 3 Gbps speeds.

MORE ON THE WEB

- SAS Connectivity Module info on PartnerWorld
- SAS Connectivity Module info on IBM.com

5

IBM System Networking

The combination of powerful systems for virtualization and converged networks will greatly optimize data center efficiency. However, it requires a closer collaboration in the entire solution stack, including networking. For years,

> **MORE ON THE WEB**
>
> • Overview of all IBM System Networking on IBM.com

IBM has been a trusted vendor for enterprise-class servers, and we are now pleased to offer a broad range of networking switches.

System Networking Basics

Networking is an essential element in a dynamic infrastructure and an integral part of the strategy to reduce costs, improve services, and manage risk. Organizations must continue to focus on server and storage hardware optimization, technology enhancements, service management improvement, security, resiliency, and integration projects between IT and extended business assets. However, it is important to realize that the network is essential to support these initiatives and to ensure that the maximum benefit is derived.

Five important trends are reshaping today's data center networks:

1. Expanding system virtualization (e.g., VMware, Microsoft's Hyper-V, Xen, and KVM): Organizations of all sizes are enhancing their IT agility through the use of cloud-service architectures to enable rapid deployment of new services and to support rapid growth in any particular service. Additionally, organizations are improving their return on their IT investments through the use of virtualization to support server consolidation. It has been estimated that, in distributed computing environments, up to 85 percent of computing capacity sits idle. Server virtualization and consoliation, however, also consolidates network traffic, resulting in very different network traffic characteristics—driving up bandwidth requirements, starting at the server adapters, and continuing through network access and into the network core.

2. Increasing virtual machine (VM) mobility: Once virtualized systems have been implemented, it is only natural to want to take advantage of VM-mobility capabilities (such as VMware's VMotion) for higher service availability and performance. Because of the way IP routing protocols work, however, in order for a VM to successfully move from one system to another, both systems must be on the same IP "subnet," driving the need for fundamental changes to data center network designs—also called "flatter" networks. In addition, however, many organizations use virtual LANs (VLANs), access control lists (ACLs), and quality of service (QoS) settings in the network to enforce systems security and improve service performance. Consequently, when a VM moves, the network

must be "VM aware" in order to move those network settings along with it.

3. Growth in distributed application models: Network traffic to and from transaction-based applications historically flowed into the data center directly to the server that would respond to the transaction and the response would flow straight back to the requester (often called "north/south" traffic). With today's distributed application environments such as Web services, service oriented architectures, and scale-out application environments, however, a single request can result in many sub-requests flowing back and forth between back-end systems ("east/west" traffic). It has been estimated that today 80 percent or more of data center traffic is east/west traffic. And, because that traffic is between computing systems, the overall responsiveness of the IT service is extremely sensitive to network latency. Consequently, in order to deliver satisfactory IT services, organizations must focus on very-low-latency switching at the server network edge switches.

4. Pressure to support network convergence: Storage networks have grown to where the costs of running separate networks are significant—and an attractive target for IT operational cost-cutting initiatives. Likewise, "lossless" Ethernet technologies (e.g., data center bridging standards) are getting to the point that they can provide a viable converged alternative to separate storage and data networks. And, with the pressures to increase bandwidths—for both storage and data network—being driven by virtualization and consolidation, storage and data network convergence seems inevitable.

Network upgrades, particularly for the server network edge switches, will be required in order to deliver those lossless Ethernet capabilities.

5. Increasing energy costs and constraints: Data center energy costs are significant and, in some cases, constraints on available power have prevented organizations from meeting growing IT service requirements. It has been estimated that networking equipment uses about one-sixth of a data center's overall power requirements, making energy efficiency a key requirement for all new networking equipment. In addition, many data centers are adopting "hot-aisle/cold-aisle" layouts in order to improve cooling efficiency; consequently, it is important to ensure that the air flow of networking switches matches that of the rest of the systems in the rack.

Seeing that those trends all intersect at the data-center server-access switches and recognizing that those switches can either facilitate or inhibit success in responding to those trends, IBM has made a significant investment in its System Networking portfolio. IBM offers:

MORE ON THE WEB

- System networking info on PartnerWorld
- System networking info on IBM.com
- IBM System Networking RackSwitch Sales Kit

- A portfolio of server-access switches from IBM System Networking (2010 BNT acquisition) with 1 Gb, 10 Gb, and 40 Gb Ethernet, delivering:
  - Substantially better price/performance

- – Virtual Machine awareness through VMready technology

- – Low-latency

- – Lossless Ethernet support

- – Industry-leading energy efficiency

- Data center core and wide-area network access switches

- Switches supporting Fiber Channel Over Ethernet and connectivity to the leading Fiber Channel SANs

- Campus networking switches with robust support for Power Over Ethernet (for devices such as IP telephones, wireless access points, and security cameras).

IBM System Networking Product Quick Reference

IBM System Networking enables an open approach to data center networking, ensuring that clients can implement smarter computing solutions using best-in-class networking equipment. In this section, we will explore the IBM System Networking portfolio of switches and routers.

IBM System Networking Switches

In October 2010, IBM acquired BLADE Network Technologies (BNT) to bring speed and intelligence to the network edge and to build the foundation for what is now IBM System Networking. In this section, we will take a look at the portfolio of offerings. In October 2011, IBM announced IBM Networking Operating System and IBM System Networking Element Manager, giving IBM System Networking our own OS and

management tools for our portfolio of IBM engineered and designed products. You will also notice that IBM is moving away from the BNT brand to IBM System Networking with the announcement of IBM System Networking RackSwitch G8316.

IBM VMready

IBM VMready is switch-resident software that reduces the complexity of configuring and managing virtual machines throughout the network, making it VM-Aware. The network can be configured and managed for thousands of virtual ports (v-ports), rather than just a few physical ports, without manual intervention.

> **MORE ON THE WEB**
>
> • VMready info on PartnerWorld
> • VMready info on IBM.com

With VMready, as VMs migrate across physical hosts, so do their network attributes automatically. VMready allows you to manage virtual machines as they are added, moved, and removed, while retaining the same ACLs, QoS, and VLAN attributes. VMready allows for a "define once, use many" configuration that evolves as the server and network topologies evolve.

VMready works with all virtualization products, including VMware, Microsoft's Hyper-V, Xen, PowerVM, and KVM, without modification of Virtual Machine Hypervisors or Guest operating systems. Virtual Vision enables network virtualization between data centers.

IBM RackSwitch Portfolio

Data centers can standardize on a unified and affordable rack-level, or top of rack, network infrastructure to provision

and scale out Web 2.0 environments, high-performance clusters, and virtualized data centers. IBM's Ethernet RackSwitch family is designed to bring speed and intelligence to the edge of your network; where it's closer to your business, users, and innovations. IBM's top of rack products are lossless, low latency, and low power.

IBM RackSwitches are virtual—providing rack-level virtualization of networking interfaces for a rack full of server and storage systems—decoupling the scaling of networking and computing capacity via on-switch VMready software. VMready enables the movement of virtual machines—providing matching movement of VLAN assignments, ACLs, and other networking and security settings. VMready works with all leading VM providers (VMware, Citrix Xen, Microsoft, etc.).

IBM RackSwitches are cool—implementing a choice of directional cooling to maximize data center layout and provisioning. Its superior air-flow design complements the hot-aisle and cold-aisle data center cooling model.

IBM RackSwitches are easy—with server-oriented provisioning via point-and-click management interfaces, along with the optional BLADEHarmony Manager software package for updating large groups of switches.

IBM RackSwitches are designed with line-rate throughput and low latency with some at significantly less than 1 microsecond.

IBM BNT RackSwitch G8000

The IBM RackSwitch G8000 (Figure B.1) is an Ethernet switch specifically designed for the data center, providing a virtual, cooler, and easier network solution.

- G8000 info on PartnerWorld
- G8000 info on IBM.com

Figure B.1. IBM RackSwitch G8000 (and links to more detail).

Here are some quick G8000 facts:

- 44 x 1 GbE RJ45 ports, four 1 GbE SFP ports, and up to four optional 10 GbE SFP+ or CX4 ports

- The G8000 has server-like rear-to-front (G8000R) or front-to-rear (G8000F, G8000DC) airflow models, allowing for significant savings in cooling costs

- Low 120 W power draw and variable speed fans help reduce power consumption; DC power model is also available

- Simplified configuration with an Industry-Standard Command Line Interface (IS CLI, very similar to the CLI used with Cisco switches)

- System virtualization support—VMready automatically detects virtual machine movement from one physical server to another.

Figure B.2.   IBM RackSwitch G8052 (and links to more detail).

IBM BNT RackSwitch G8052

The IBM RackSwitch G8052 (Figure B.2) is an Ethernet switch specifically designed for the data center, providing a virtual, cool, and easy network solution.

Here are some quick G8052 facts:

- 48 × 1 GbE RJ45 ports and four standard 10 GbE SFP+ ports

- Choice of airflow direction, allowing for significant savings in cooling costs

- Low 130 W power rating with hot-swap power supplies and variable speed fans help reduce power consumption

- Network virtualization—VMready automatically detects virtual machine movement from one physical server to another.

IBM BNT RackSwitch G8124

The IBM RackSwitch G8124 (Figure B.3) is a 10 Gigabit Ethernet switch specifically designed for the data center, providing a virtual, cooler, and easier network solution. The G8124 offers 24 10 Gigabit Ethernet ports in a high-density, 1U foot-

- [G8124 info on PartnerWorld](#)
- [G8124 info on IBM.com](#)

Figure B.3.   IBM RackSwitch G8124 (and links to more detail).

print. Designed with top performance in mind, the RackSwitch G8124 provides line-rate, high-bandwidth switching, filtering, and traffic queuing without delaying data and large data-center grade buffers to keep traffic moving.

The G8124 also supports Virtual Fabric, which allows for the carving up of a physical NIC into two to eight virtual NICs (vNICs) and creates a virtual pipe between the adapter and the switch for improved performance, availability, and security, while reducing cost and complexity. The G8124 supports the newest protocols—including Data Center Bridging/Converged Enhanced Ethernet (DCB/CEE) for support of Fibre Channel over Ethernet (FCoE) and iSCSI.

Here are some quick G8124 facts:

- 24 SFP+ ports that operate at 10 Gigabit or 1 Gigabit Ethernet speeds

- Optimal for high-performance computing and applications requiring high bandwidth and low latency

- All ports are non-blocking 10 Gigabit Ethernet with deter-ministic latency of 680 nanoseconds

- IBM VMready helps reduce configuration complexity and im-proves security levels in virtualized environments with VM mobility

- IBM Virtual Fabric capability allows for the carving up of a physical NIC into multiple virtual NICs

- G8124E models are equipped with enhanced processing and memory to improve performance for larger layer 3 networks, at the aggregation layer, high-end multicast applications, and rapid failover.

IBM BNT RackSwitch G8264

The IBM RackSwitch G8264 (Figure B.4) is a 10 and 40 Giga-bit Ethernet (GbE) switch specifically designed for the data center, providing speed, intelligence, and interoperability on a proven platform.

- G8264 info on PartnerWorld
- G8264 info on IBM.com

Figure B.4.   IBM RackSwitch G8264 (and links to more detail).

The RackSwitch G8264 offers the flexibility to use break out cables in the 40 GbE ports supporting up to 64x10 GbE ports in a small 1U footprint. Designed with top performance in mind, the RackSwitch G8264 provides line-rate, high-bandwidth switching, filtering, and traffic queuing without delaying data. Large data center grade buffers keep traffic moving. Hot swap redundant power and fans along with numerous high availability features enable the RackSwitch G8264 to be available for business-sensitive traffic.

The low latency offered by the RackSwitch G8264 makes it ideal for latency-sensitive applications such as high performance computing clusters and financial applications. The G8264 supports the newest protocols—including Data Center Bridging/Converged Enhanced Ethernet (DCB/CEE) for support of Fibre Channel over Ethernet (FCoE) and iSCSI.

Here are some quick G8264 facts:

- Optimized for applications requiring high bandwidth and low latency

- Up to 64 1 Gb/10 Gb SFP+ ports in a 1U form factor

- Future-proofed with four 40 Gb QSFP+ ports

- 1.28 Tbps non-blocking throughput and sub 1 microseconds latency

- Open Flow 1.0 support enabling innovation in networking and routing protocols for the future

- IBM VMready helps reduce configuration complexity and improves security levels in virtualized environments with VM mobility

- IBM Virtual Fabric capability allows for the carving up of a physical NIC into multiple virtual NICs.

IBM System Networking RackSwitch G8316

The IBM System Networking RackSwitch G8316 (Figure B.5) is a 40 Gigabit Ethernet (GbE) aggregation switch designed for the data center, providing speed, intelligence, and interoperability on a proven platform.

The RackSwitch G8316 offers up to 16×40 GbE ports, which can also be used as a high-density 10 GbE switch using break-out cables (up to 64x10 GbE ports), with 1.28 Tbps—in a 1U foot-print. The G8316 provides a cost-efficient way to aggregate multiple racks of servers compared to other expensive core switches, while allowing massive scalability for your data center network. It is an ideal aggregation layer switch when used with the 10/40 GbE IBM RackSwitch G8264 at the access layer.

Designed with top performance in mind, the RackSwitch G8316 provides line-rate, high-bandwidth switching, filtering, and traffic queuing without delaying data. Large data center grade buffers keep traffic moving. Hot-swappable, redundant power and fans, along with numerous high-availability features enable the RackSwitch G8316 to be available for business-sensitive traffic.

- • G8316 info on PartnerWorld
- • G8316 info on IBM.com

Figure B.5. IBM System Networking RackSwitch G8316 (and links to more detail).

Here are some quick G8316 facts:

- • Optimized for applications requiring high bandwidth and low latency

- • Sixteen 40 Gb QSFP+ ports in a 1U form factor

- • Up to 64 10 Gb SFP+ ports to form a high-density 10 Gb cluster

- • Powerful control plane providing higher performance to aggregate multiple racks of servers

- • 1.28 Tbps non-blocking throughput.

b-Type Ethernet Switches and Routers

Brocade acquired Foundry Networks in late 2008—bringing a line of low-cost, high-port-density, and high-performance Ethernet switches to the Brocade product set. IBM has partnered with Brocade for our IBM b-type portfolio—Brocade switches

and routers with the IBM warranty and support that you have come to trust. An important strength of these products is that their Command Line Interface (CLI) is very similar to those of Cisco switches—easing the introduction of IBM b-type switches into existing Cisco environments.

Additionally, the idea of a single, converged, infrastructure (or "fabric") for both storage and Ethernet—a single high-speed infrastructure, a single set of management tools, and a single support team—is compelling for many customers. A key challenge is that interoperability among storage networks is limited (more so than in data networking) by vendor-proprietary technologies. You will minimize the potential for problems by going with a convergence solution from your storage networking vendor—and Brocade has greater than 50 percent market share in storage networking. (A large part of the remaining share belongs to Cisco, so also check out our Cisco Nexus products discussed below.)

g-series Ethernet Switches

IBM b-type g-series Ethernet access switches (Figure B.6) provide enterprise organizations with a flexible and feature-rich solution for building a secure and converged network edge. The switches support 48x 1 GbE RJ45 ports including 4x 1 GbE SFP combination ports. The B48G is upgradeable with two 10 GbE uplink ports to consolidate connections into the enterprise aggregation point, campus LANs, or metro area networks. The B50G comes with 2x 10 GbE CX4 stacking ports, providing the flexibility of a "pay-as-you-grow" architecture.

Both models enable a converged solution for vital network applications such as VoIP, wireless access, WebTV, video surveillance, building management systems, triple play (voice + video + data) services, and remote video kiosks in a cost-effective, high-performance, compact design. Support for the IEEE 802.1AB LLDP and ANSI TIA 1057 LLDP-MED standards enables organizations to deploy interoperable, multi-vendor solutions for unified communications. Configuring IP end-points, such as VoIP stations, can be a complex task requiring manual and time-consuming configuration.

Here are some quick Ethernet switch b-type g-series facts:

- Compact 48-port 10/100/1000 Mbps access switches are field upgradeable to support Class 3 Power over Ethernet (PoE) providing 15.4 watts of power per port

- g-series info on PartnerWorld
- g-series info on IBM.com

Figure B.6.   IBM g-series Ethernet switches (and links to more detail).

- Full IPv4 Layer 2 switching capabilities facilitate network resiliency

- Base Layer 3 capabilities enable routed topologies to the network edge; supported features include: RIP v1/v2 route announcement, static IP routes, virtual and routed interfaces, DHCP relay, and VRRP

- Helps optimize network traffic with Layer 2 multicast support

- Available edge Layer 3 upgrade extends routing to the network edge

- B50G model features advanced Iron Stack stacking technology over 2x 10 GbE CX4 ports, allowing up to eight systems to be stacked and managed as a single virtual chassis

- Highly available, hot-swappable, N+1 load-sharing AC power supplies

- Advanced suite of security capabilities, including ACLs, MAC filters, TCP SYN and ICMP denial of service (DoS) protection, Spanning Tree Protocol BPDU guard, root guard, unicast, broadcast and multicast rate limiting, 802.1X authentication, and enhanced lawful intercept features.

c-series Ethernet Switches

The IBM b-type c-series Ethernet switches (Figure B.7) are a family of compact 1 RU, multi-service edge/aggregation switches with a powerful set of capabilities combining performance with rich functionality at the network edge. These switches offer network planners a broad set of high-perfor-

- • c-series info on PartnerWorld
- • c-series info on IBM.com

Figure B.7. IBM c-series Ethernet switches (and links to more detail).

mance Layer 2, IPv4 unicast, and multicast capabilities in the same device.

b-type c-series Ethernet switches are designed to meet the challenges of large data centers and campus environments by providing a broad set of features, including wire speed performance, deep packet buffers (64 MB per 24-port 1 GbE or 2-port 10 GbE group), and low latency in a compact 1U form factor. To ensure a robust and scalable switching infrastructure, a wide variety of Spanning Tree Protocols are supported including SSTP, RSTP, MSTP, and PVST/PVST+ compatibility.

Here are some quick Ethernet b-type c-series facts:

- • Compact 1 RU IP/MPLS/VRF-capable switch that is purpose-built for a large data center and advanced carrier Ethernet applications

- • Wire-speed, non-blocking performance in all models

- Available 24-port and 48-port configurations in both 100/1000 MbE SFP (HybridFiber) and 10/100/1000 MbE RJ-45 configurations to suit versatile access/aggregation deployment

- Full Layer 2 switching capabilities facilitate network resiliency

- Base Layer 3 capabilities enable routed topologies to the network edge

- Available Full Layer 3 or Metro Edge upgrade enables maximum scalability or deployment into metro networks

- MEF 9 and MEF 14 certified, with comprehensive operations, administration, and maintenance (OAM) capabilities based on IEEE 802.1ag-2007 and MEF Service OAM Framework.

y-series Ethernet Switches

IBM Ethernet Switch B24Y (4002BY2), B48Y (4002BY4), and B24Y (4002CY2) provide new levels of performance, scalability, and flexibility required to support today's dynamic network infrastructures (Figure B.8). Featuring advanced capabilities, these switches deliver performance and intelligence to the network access layer in a compact 1 RU form factor, helping reduce infrastructure and administrative costs.

Available in 24-port and 48-port models, these wire-speed and non-blocking switches are available with Power over Ethernet Plus (PoE+) to deliver up to 30 watts of power to edge devices, enabling next-generation campus applications. PoE+ models can utilize built-in 16 Gbps stacking ports, enabling organizations to stack up to eight switches into a single logical switch with up to 384 ports. These features enable pro-

- y-series info on PartnerWorld
- y-series info on IBM.com

Figure B.8.   IBM b-type y-series Ethernet switches are offered in 24-port and 48-port stackable models for robust growth.

gressive, scalable growth within an enterprise campus environment.

Here are some quick y-series facts:

- Convergence ready—power next-generation devices through a single cable with high-bandwidth data delivery

- Highly flexible—pay-as-you-grow expansion utilizing Iron-Stack technology delivers a 384-port logical switch

- Proven reliability—tested for interoperability with IBM systems technology

- Simplified deployment—increase operational efficiency with industry-standard CLI and automated management tools

- Fully featured—includes Layer 3 routing functionality with no additional licensing required

- Superior scalability—supports higher numbers of routes, addresses, and VLANs compared to products in class.

x-Series Ethernet Switch B24X

The IBM b-type Ethernet Switch B24X (Figure B.9) is a compact, high-performance, high-availability, and high-density 1 RU switch specifically designed for mission-critical data centers and HPC requirements. This switch provides 24 10/1 GbE (SFP+) ports plus four 10/100/1000 MbE (RJ45) ports of connectivity in an ultra-low-latency, cut-through, non-blocking architecture.

This switch is an ideal cost-effective solution for server or compute-node connectivity. It can support 1 GbE servers until they are upgraded to 10 GbE-capable network interface cards (NICs), simplifying migration to 10 GbE server farms. In addition, the switch can be positioned as a 10 GbE aggregation switch behind 1 GbE access switches.

Here are some quick Ethernet Switch b-type x-series facts:

- A 1U, high-density top-of-rack data center switch for 10 GbE server access and aggregation with 24 10 GbE/1 GbE dual-speed (SFP+) ports plus four 10/100/1000 Megabit Ethernet (MbE) (RJ45) ports

- x-series info on PartnerWorld
- x-series info on IBM.com

Figure B.9.   IBM Ethernet Switch x-series (and links to more detail).

- Flexibility to mix 10 GbE and 1 GbE servers, protecting investments and streamlining migration to 10 GbE-capable server farms

- Wire-speed performance with an ultra-low-latency, cut-through, non-blocking architecture that is ideal for HPC environments

- Highly efficient power and cooling with front-to-back airflow, automatic fan speed adjustment, and use of SFP+ and direct attached SFP+copper (Twinax) for maximum flexibility

- High availability with redundant, load-sharing, hot-swappable, auto-sensing/switching power supplies, and silent triple-fan assembly

- End-to-end quality of service (QoS) with hardware-based marking, queuing, and congestion management

- Embedded per-port sFlow capabilities to support scalable hardware-based traffic monitoring

- Can also be purchased with 24 Converged Enhanced Ethernet (CEE) ports concurrently active at 10 Gbps link speeds and optional activation of eight 8 Gbps Fibre Channel (FC) ports for a lower entry cost.

Converged Switch B32

The IBM b-type Converged Switch B32 (<u>Figure B.10</u>) is designed to provide outstanding performance with a reliable platform that helps reduce cabling complexity, equipment acquisition costs, and operational costs associated with space,

- Converged Switch info on PartnerWorld
- Converged Switch info on IBM.com

Figure B.10.   IBM b-type Converged Switch B32 (and links to more detail).

power consumption, and cooling. This multi-protocol top-of-rack switch features excellent space efficiency and low power consumption, leading the way toward a "greener" data center.

The B32 features eight 8 Gbps FC ports along with 24 CEE ports with 10 Gbps link speeds. The CEE ports are capable of transporting both FC storage area network (SAN) data and Ethernet LAN traffic—eliminating the need for separate SAN and LAN adapters and cables.

Here are some quick Converged Switch B32 facts:

- Outstanding performance with eight Fibre Channel (FC) ports concurrently active at 8 Gigabits per second (Gbps) and 24 Converged Enhanced Ethernet (CEE) ports concurrently active at 10 Gbps link speeds

- High density design with 32 ports in a 1U enclosure

- "Green" energy efficiency significantly reduces power consumption while generating less heat

- Enterprise-class availability features such as hot-swappable, redundant, and integrated fan and power supply assemblies

- Streamlines management by utilizing IBM System Storage Data Centre Fabric Manager (DCFM) and extensions for FCoE and CEE.

s-series Ethernet Switches B08S and B16S

IBM b-type s-series Ethernet switches (<u>Figure B.11</u>) meet today's demanding requirements to protect, optimize, and grow the enterprise from basic connectivity to much higher levels of intelligent service-based infrastructures, providing even greater value to organizations. A highly dense, resilient, and flexible architecture allows scaling up to 384 10/100/1000 Mbps Class 3 (15.4 watts) PoE capable ports or 36 ports of high-speed 10 GbE.

Designed to extend control from the network edge to the backbone, the switches provide intelligent network services, including superior quality of service (QoS), predictable performance, advanced security, comprehensive management, and integrated resiliency. A common operating system and shared interface and power supply modules between the Ethernet Switch B08S and B16S help reduce the cost of ownership by minimizing operational expenses and improving return on investment (ROI).

Here are some quick Ethernet Switch b-type s-series facts:

- Optimized for total network convergence, supports industry-leading auto-detecting IEEE 802.3af class 1, 2, and (up to 15.4 watts) Power over Ethernet (PoE) interfaces

- Wire-speed, scalable, low-latency 10 Gigabit Ethernet (GbE) support along with advanced quality of service (QoS) ideal to carry the widest varieties of application traffic

- Highly available and resilient 1+1 management, fabric, and N+1 power architecture helps enable critical business continuity

- Robust PoE auto-detection enables support for PoE and non-PoE devices along with auto-configuration of VoIP endpoints to simplify device deployment

- Full Layer 2 switching capabilities facilitate network resiliency

- Base Layer 3 capabilities enable routed topologies to the network edge

- s-series info on PartnerWorld
- s-series info on IBM.com

Figure B.11.   IBM Ethernet s-series switches (and links to more detail).

- Helps optimize network traffic with Layer 2 multicast support

- Available Full Layer 3 and IPv6 options ensure maximum scalability for future network growth.

r-series Ethernet Switches

IBM r-series Ethernet switches (<u>Figure B.12</u>) are available in three chassis models, allow network designers to standard-ize on a single product family for end-of-row, aggregation, and backbone switching, and are ideal for data center and enterprise deployment. In addition, the switches, with their high-density and compact design, are an ideal solution for high-performance computing (HPC) environments, Internet exchanges, and Internet service providers (IXPs and ISPs) where non-blocking, high-density Ethernet switches are needed.

These switches enable network designers to deploy an Eth-ernet infrastructure that addresses today's requirements with a scalable architecture designed to support network growth and evolution. The switches incorporate the latest advances in switch architecture, system resilience, quality of service, and switch security in a family of modular chassis setting leading industry benchmarks for price-performance, reliabil-ity, scalability, and TCO.

Here are some quick Ethernet switch b-type r-series facts:

- 4, 8, and 16-slot high-capacity modular switches for end-of-row, aggregation, and core switching in data centers, large enterprises, HPC, IXP, and ISP networks

- Powerful suite of unicast and multicast IPv4 and IPv6 protocol support

- Interchangeable half-height line modules reduce sparing costs, TCO, and provide cost-effective modular growth

- Highly density chassis design supports up to 512 10 GbE or 1536 wire-speed 1 GbE ports in a single 32-slot chassis

- High availability design features redundant and hot-pluggable hardware, hitless Layer 2 software upgrades, and graceful BGP (Border Gateway Protocol) and OSPF (Open Shortest Path First) restart

- Advanced non-blocking Clos fabric features adaptive self-routing with graceful system degradation in the event of two or more module failures

- r-series info on PartnerWorld
- r-series info on IBM.com

Figure B.12.   IBM Ethernet r-series switches (and links to more detail).

- End-to-end QoS (quality of service) supported with hardware based honoring and marking and congestion management

- Scalable hardware-based IP routing to 512,000 IPv4 routes per line module

- High-capacity 80 Gbps cross-module link aggregation supports high-bandwidth inter-switch trunking

- Embedded sFlow per port supports scalable hardware-based traffic monitoring across all switch ports without impacting performance.

m-series Ethernet/IP Routers

IBM b-type m-series Ethernet routers (Figure B.13) provide high port density with up to 128 10 GbE, 1536 1 GbE, or 256 OC-12/48 ports in a single system with either 4-, 8-, 16-, or 32-slot configurations. This series of switching routers offers a rich set of high-performance IPv4, IPv6, multiprotocol label switching (MPLS) and multi-virtual routing and forwarding (VRF) capabilities as well as advanced Layer 2 switching to address the diverse needs of environments ranging from large enterprises, data centers, government networks, education and research networks, high performance computing, and metro networks to ISPs.

Designed to enable reliable converged infrastructures and support mission-critical applications, the m-series features an advanced N+1 redundant switch fabric architecture designed for very high availability, even in the case of a switch fabric card failure. The redundant fabric architecture is complemented by comprehensive hardware redundancy for the management modules, power supplies, and cooling system.

- m-series info on PartnerWorld
- m-series info on IBM.com

Figure B.13.   IBM m-series Ethernet/IP routers (and links to more detail).

Here are some quick Ethernet Router b-type m-series facts:

- Up to 10 Gb/second Ethernet routing and switching with a variety of capacities and interface options to meet the expanding needs of high-end enterprises and service providers

- Designed for low power consumption and efficient heat dissipation

- Provides wire-speed performance for IP/MPLS routing and switching combined with advanced packet processing and traffic management capabilities

- High port density and compact size yields significant savings for network operators, including savings on power, cooling, and rack space costs

- Full IPv4 and IPv6 Layer 2 and Full Layer 3 capabilities for maximum deployment performance and versatility.

j-type Ethernet Switches and Routers

Juniper has a strong heritage in the high-end Internet Service Provider router market, and has expanded into enterprise networking. IBM partnered with Juniper for our IBM j-type networking offerings.

Many organizations are attracted to the idea of a single-vendor (usually Cisco) network, but the promise of "single vendor" is often different from the reality. For example, by adding Cisco Nexus switches to an existing Cisco network, you'll be adding a different "operating system," NX-OS, to maintain and operate—along with the existing Cisco-based IOS versions currently in the network. One of the key Juniper (IBM j-type) value propositions is its use of a single, consistent operating system, called JUNOS, across all of the routing and switching products—one maintenance stream and one user interface. This can make it worthwhile to consider adding IBM j-type offerings to a network—especially if there is the prospect of ultimately consolidating down to a single operating system for a substantial part of the networking environment.

Another key IBM j-type innovation is the Virtual Chassis technology—which enables grouping up to 10 IBM J48E switches into a single, virtual switch. The individual switches can be interconnected using 1 Gigabit Ethernet (GbE), 10 GbE, or

with 64 Gigabit "Virtual Chassis Cables" (for up to 5 meters) and behave as if they were a single switch (no need for spanning tree protocols)—potentially providing very substantial cost savings by reducing the need for high-speed uplinks to the network core. (But do not try to mix in someone else's switches: Virtual Chassis is only supported on Juniper, IBM j-type switches.)

Ethernet Switch J08E and J16E

The IBM Ethernet Switch J08E and J16E (Figure J.1) offer eight and 16 slots, respectively, supporting high-density Gigabit and 10 Gigabit Ethernet connections.

- J08E info on PartnerWorld
- J16E info on PartnerWorld
- J08E and J16E info on IBM.com

Figure J.1.   IBM Ethernet Switch J08E and IBM Ethernet Switch J16E (and links to more detail).

The IBM Ethernet Switch J08E and IBM Ethernet Switch J16E are designed to deliver the performance, scalability, and high availability required to support high-density data center, cloud computing, and enterprise campus environments.

The high-density, high-performance J08E and J16E are also used for aggregating access switches deployed in data center top-of-rack or end-of-row applications, as well as for supporting Gigabit Ethernet server access in data center end-of-row deployments. The J08E delivers up to 960 million packets per second (Mpps) of high-density, wire-speed 10 GbE performance, while the J16E delivers approximately 1.9 billion packets per second (Bpps) of 10 GbE performance. Both systems are designed to provide sufficient capacity to support the most demanding data center networks.

Here are some quick J08E and J16E facts:

- High-performance 8-slot (J08E) and 16-slot (J16E) modular switches support data center and campus LAN core and aggregation deployments

- Scalable switch fabric delivers up to 320 Gbps per slot

- Carrier-class architecture includes redundant internal Routing Engines, switch fabrics, power and cooling, ensuring uninterrupted forwarding and maximum availability

- 48-port 10/100/1000BASE-T and 100BASE-FX/1000BASE-X line cards support up to 384 (J08E) or 768 (J16E) GbE ports per chassis

- Eight-port 10GBASE-X line cards with SFP+ interfaces deliver up to 64 (J08E) or 128 (J16E) 10 GbE ports per chassis

- All IBM j-type switches and routers run the same modular, fault-tolerant Juniper Networks JUNOS Software operating system.

Ethernet Switch J48E

Running Juniper Networks JUNOS Software operating system, the IBM Ethernet Switch J48E (Figure J.2) was designed for high-performance server access deployments. A single switch can be deployed initially; as requirements grow, Virtual Chassis technology allows up to nine additional switches to be interconnected over a 128 gigabit-per-second (Gbps) backplane and managed as a single device, with a single configuration file and OS image. Modular Gigabit Ethernet (GbE) and 10-Gigabit Ethernet (10 GbE) uplink module options enable virtual chassis technology to be extended to switches in different racks or even in different data centers.

- J48E info on PartnerWorld
- Ethernet Switch J-type e-series info on IBM.com

Figure J.2.   IBM Ethernet Switch J48E (and links to more detail).

The Ethernet Switch J48E combines the high availability (HA) and carrier-class reliability of modular systems, and it is designed to deliver:

- 1 RU, 320 watts with power over Ethernet

- 48 ports of 10/100/1000BASE-T ports

- Virtual chassis technology allowing up to 480 ports as a single logical device

- Optional 10 GbE uplink ports to j-series core switches (4274Exx and 4274-Mxx)

- Eight ports of Power over Ethernet

- Redundant, internal hot-swappable power supplies

- Hot-swappable fan tray with redundant blowers

- Consistent modular JUNOS control plane feature implementation

- Dual route engines with graceful routing engine switchover (GRES)

- Single management interface

- Scales from 48 to 480 ports with up to twenty 10 GbE uplinks.

Ethernet Router J02M, J06M, and J11M

IBM Ethernet Routers j-type m-series (Figure J.3) offer powerful switching and security capabilities designed to de-

liver the reliability and flexibility needed to accelerate new business innovations. These routers offer innovations with advanced routing features and high performance application-specific integrated circuits (ASICs).

Optimized for Ethernet, these routers are used to bring high performance, scalability, and availability for LAN aggregation and core and data center aggregation and core deployments.

All three j-type m-series routers are designed to address high performance networking requirements that benefit from advanced routing features such as network virtualization with MPLS, QoS, logical interface scalability, high availability (HA), and low-latency multicast.

- Ethernet Switch j-type m-series info on PartnerWorld
- Ethernet Switch j-type m-series info on IBM.com

Figure J.3.   IBM Ethernet Switch J02M, J06M, and J11M (and links to more detail).

IBM Ethernet Routers J02M, J06M, and J11M deliver high-port density as well as performance of up to 960 Gbps throughput, scalability, and reliability in a space-efficient package. The routers offer fully redundant hardware that includes a redundant switch control board (SCB) and routing engines (REs) plus fan trays and power supplies designed to increase system availability.

Here are more facts about the j-type m-series routers:

- J02M offers up to 120 Gigabit Ethernet or up to 12 10-Gigabit Ethernet ports

- J06M offers up to 240 Gigabit Ethernet or up to 24 10-Gigabit Ethernet ports

- J11M offers up to 480 Gigabit Ethernet or up to 48 10-Gigabit Ethernet ports

- J02M has three DPC slots—two with SCB redundancy and 40 Gbps per slot

- J06M has eight slots—two for fabric cards/REs; up to 240 Gbps (full-duplex) from six line cards

- J11M has 14 slots—two for fabric cards/REs with the option of one additional SCB for redundancy; up to 480 Gbps (full-duplex) from 12 line cards

- Throughput: J02M up to 240 Gbps; J06M up to 480 Gbps; J11M up to 960 Gbps.

Ethernet Appliance J34S and J36S

Based on an innovative Dynamic Services Architecture, the IBM Ethernet Appliance J34S and IBM Ethernet Appliance J36S (Figure J.4) reset the bar in price/performance for enterprise environments. Each multi-services appliance can support near-linear scalability with each additional Services Processing Card (SPC), enabling the J36S to support up to 30 Gbps of firewall throughput, 2.25 million concurrent sessions, and 175,000 new VPN connections per second. The appliances offer denial of service (DoS), network address translation (NAT), virtual private network (VPN) support and quality of service (QoS). The SPCs are designed to support a wide range of services, enabling future support of new capabilities without the need for service-specific hardware. Using SPCs on all services ensures that there are no idle resources based on specific services in operation—maximizing hardware utilization. Market-leading flexibility and price/performance of the IBM Ethernet Appliance J34S and J36S come from the modular architecture. The IBM J34S and IBM J36S are next-generation multiservices appliances delivering leading scalability and service integration in a mid-size form factor. These appliances are suited for medium-to-large enterprise networks.

Here are some quick J34S and J36S facts:

- Scalable multiservices security platform delivers superior performance and flexibility to protect high-speed data center network environments

- Network segmentation supports unique security policies to isolate guests and regional servers or databases

- Ethernet Appliance J34S info on PartnerWorld
- Ethernet Appliance J36S info on PartnerWorld
- Ethernet Appliance J34S and J36S info on IBM.com

Figure J.4.   IBM Ethernet Appliances J34S and J36S (and links to more detail).

- Comprehensive threat management features on Junos software—including multi-gigabit firewall, IPsec VPN, DoS—support integrated protection of enterprise networks

- Data center-class hardware design and proven OS for reliable and resilient network deployments

- High availability interfaces to help achieve resiliency necessary to meet the critical demands of enterprise data centers.

Ethernet Appliance J56S and J58S

Based on the Dynamic Services Architecture, the IBM Ethernet Appliance J56S and J58S (Figure J.5) provide market-leading scalability. Each multiservices appliance can support almost linear scalability, with each additional services processing card (SPC). A range of features including denial of

service (DoS) protection, network address translation (NAT), virtual private network (VPN) support and quality of service (QoS). The SPCs are designed to support a wide range of services enabling future support of new capabilities without the need for service-specific hardware. Using SPCs on all services ensures that there are no idle resources based on specific services being used—maximizing the utilization of equipped hardware. The IBM J56S and IBM J58S are next-generation multiservices appliances delivering leading scalability and service integration in a mid-size form factor. These appliances are suited for medium-to-large enterprise networks.

- Ethernet Appliance J56S info on PartnerWorld
- Ethernet Appliance J58S info on PartnerWorld
- Ethernet Appliance J56S and J58S info on IBM.com

Figure J.5. IBM Ethernet Switches J56S and J58S (and links to more detail).

Here are some quick J56S and J58S facts:

- Scalable multiservices security platform delivers superior performance and flexibility to protect high-speed data center network environments

- Network segmentation supports unique security policies to isolate guests and regional servers or databases

- Comprehensive threat management features on Junos software—including multi-gigabit firewall, IPsec VPN, DoS—support integrated protection of enterprise networks

- Data center-class hardware design and proven OS for reliable and resilient network deployments

- High availability interfaces to help achieve resiliency necessary to meet the critical demands of enterprise data centers.

Juniper Networks EX2200 Ethernet Switch

The Juniper Networks EX2200 Ethernet Switch (Figure J.6) offers an economical, entry-level, stand-alone solution for top-of-rack server applications, access-layer deployments in branch and remote offices, and campus networks. Four platform configurations are available, offering 24 and 48 10/100/1000BASE-T ports with or without Power over Ethernet (PoE). Each EX2200 switch supports four fixed front panel GbE uplink ports with pluggable optics (purchased separately) for high-speed backbone or link aggregation connections. With a packet switching capacity of 56/104 Gbps, Ethernet throughput of 41.7/77.4 Mpps (wire speed), eight hardware queues for QOS, and four SFP uplinks, the EX2200 is de-

- [EX2200 info on PartnerWorld](#)
- [EX2200 info on IBM.com](#)

Figure J.6.   Juniper Networks EX2200 Ethernet Switch (and links to more detail).

signed to deliver the ultimate 1 Gigabit Ethernet top-of-rack solution. If your application includes a converged environment of servers, PCs, VoIP and video, the EX2200 provides the highest levels of flexibility (i.e., POE and POE+) and features in its class, while delivering a reliable platform for unifying enterprise communications.

Here are some quick EX2200 facts:

- Delivers high availability and high performance in a power-efficient 1U form factor

- Includes 4 Gigabit Ethernet SFP uplink ports that provide high-speed connectivity to aggregation-layer switches or other upstream devices

- JUNOS operating system delivers a consistent feature set and shortens the learning curve, lowering operational expense.

Cisco Nexus Ethernet Switches

Cisco Nexus 5000

Cisco Nexus 5000 for IBM System Storage switches (Figure J.7) support Fibre Channel, Converged Enhanced Ethernet, and Fibre Channel over Ethernet (FCoE) to help data centers simplify their growing infrastructures.

The Cisco Nexus 5010 for IBM System Storage and Cisco Nexus 5020 for IBM System Storage switches help reduce costs through data center infrastructure simplification. A unified fabric over 10 Gigabit Ethernet for server LAN and SAN traffic enables consolidation of server adapters, cables, and top-of-rack (TOR) switches by up to 50 percent. In addition, the Cisco Nexus 5010 for IBM System Storage has one expansion port and the Cisco Nexus 5020 for IBM System Storage has two expansion ports that can support any combination of the following modules:

- • Nexus 5000 info on PartnerWorld
- • Nexus 5000 info on IBM.com

Figure J.7.   Cisco Nexus 5000 (and links to more detail)

- 8-port 1/2/4 Gigabit Fibre Channel

- 6-port 1/2/4/8 Gigabit Fibre Channel

- 4-port 10 Gigabit Ethernet (DCB and FCoE) and 4-port 1/2/4 Gigabit Fibre Channel

- 6-port 10 Gigabit Ethernet (DCB and FCoE).

Here are some fast Cisco Nexus 5000 facts:

- Cisco Nexus 5020 provides up to 56 ports: 40 fixed 10 GbE and FCoE ports and 16 optional Fibre Channel ports

- Cisco Nexus 5010 provides up to 28 ports: 20 fixed 10 GbE and FCoE ports and eight optional FC ports

- Enterprise-class availability features such as hot-swappable, field replaceable, redundant power supplies, redundant fan modules, and port expansion modules

- Streamlines management by utilizing Cisco Fabric Manager Suite.

About the Editor

Jim Hoskins is the founder of Maximum Press, a premier publisher of books, ebooks, and rich media that help businesses apply technology profitably. Jim has been involved with computer technology design, implementation, and education for over 30 years. He is the author of many articles and books covering a wide range of technology and Internet business topics. Jim spent a decade with IBM designing computer systems and directly helping businesses of all sizes design and implement real-world solutions. He is the author/editor of the popular *Exploring IBM* series, which has sold over 350,000 copies in 12 languages. Jim has a degree in electrical engineering from the University of Florida and resides in Gulf Breeze, Florida, with his wife and five children. You can reach Jim via email at jimh@maxpress.com.