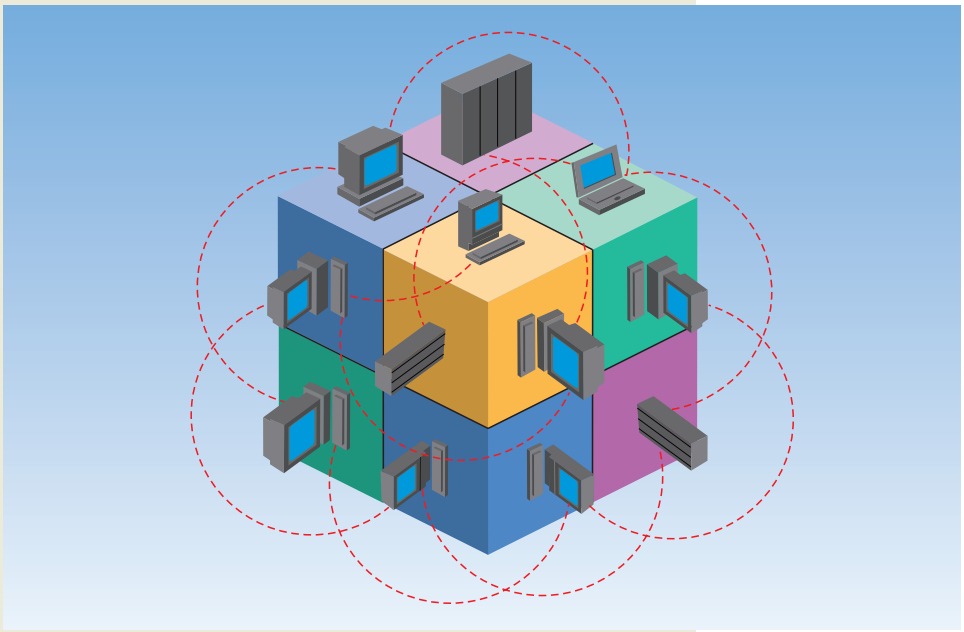
26th Edition

IBM System x and BladeCenter

Business Partner Guidebook

Your Roadmap to Success with IBM System x and BladeCenter

Max Facts™ eBook



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IBM System x and BladeCenter Business Partner Guidebook

Twenty-Sixth Edition

Your Roadmap to Success with IBM System x and BladeCenter

Edited by Jim Hoskins

(version 26.0e)

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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

More On The Web

- Check for updated editions of this guidebook

2. Apply for Your IBM PartnerWorld Membership

Join the IBM PartnerWorld Web site for all things related to being an IBM Business Partner (e.g., Business Partner relationships, guidelines, support, product info, etc.).

More On The Web

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

3. Enroll in the Systems Connect eXpert Program

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
- Explore training and certification opportunities

4. Review the System x Express Portfolio

Become familiar with the IBM Express portfolio of offerings which offer aggressive pricing, fast availability, and ease of installation.

More on the Web

- IBM Express Portfolio
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Accelerate sales of select IBM products and services to small and mid-size businesses with incentive programs, education, and demand generation support to help you generate leads.

More on the Web

- Express Seller Toolkit
- Co-marketing Center

6. Learn to Quickly Find IBM Product Information

Look at these top links on PartnerWorld so you will know how to find what you need when you need it.

More On The Web

- System x Master Resource Kit
- BladeCenter Master Resource Kit
- Business Partner Resource Kit
- IBM offering information

7. Learn to Quickly Find IBM Sales Information

Explore the sales assets resources available so you will be ready when you need it.

More On The Web

- Pre-Sales Advisor Tool (apply for a user ID and password)
- Access Quick Proposal Templates
- Sales Plays and Tactics
- Incentives and Initiatives
- Technical assistance to close deals
- Manage your opportunities with the Global Partner Portal

8. Try Out "Know Your IBM"

Eligible Business Partners can complete "Know Your IBM (KYI)" training modules to learn about IBM offerings while earning points redeemable for merchandise at participating retailers. You can earn additional points for reporting sales through KYI.

More on the Web

- "Know Your IBM" training modules

9. Start Your Path to System x Specialty

Deepen your skills and further differentiate yourself from the competition by exploring the benefits of the System x Specialty.

More On The Web

- System x Specialty Web site
- BPTV Tool
- BPTV Skills Dashboard

10. Read the Latest IBM Business Partner News

More on the Web

- Get news for IBM Business Partners

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.

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.

Reader Feedback

We welcome your feedback on any aspect of this guidebook, so please email your comments or suggestions to info@maxpress.com.

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

- email us (info@maxpress.com)
- 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.

More on the Web

- Teaming with IBM in small/mid-size business opportunities

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.

More on the Web

- About IBM's patent portfolio

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.

A Smarter Planet

On a smarter planet, change is the only constant. The most responsive and agile firms—supported with innovative business models and processes—will be positioned to lead their industries and surpass their competition.

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. 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.

More on the Web

- A Smarter Planet info on IBM.com

Smarter Computing

On a smarter planet, IT leaders are seizing the opportunity to deliver innovation that matters for customers, employees, and partners. Smarter Computing is a new and evolutionary model of the IT infrastructure that enables a smarter planet. It helps organizations rethink their IT infrastructure so they can unleash innovation through the cloud, unlock the power of Big Data, and secure critical information and business processes. The Smarter Computing approach is supported by a comprehensive portfolio of systems, software, and services, and is delivered through flexible deploy-

ment models. Smarter Computing helps organizations make the right decisions today, ensuring a smarter tomorrow.

More on the Web

- Smarter Computing overview
- PartnerWorld Smarter Computing portal

A tomorrow ready IT infrastructure which excels in three key domains provides the flexibility, efficiency, and agility to master this transition. A tomorrow ready IT infrastructure must be:

- Cloud ready—to virtualize and rationalize data centers and optimize traditional infrastructures.
- Data ready—to leverage advanced analytics to build an infrastructure that turns information into insights.
- Security ready—to manage risks, security, and compliance inside and outside of the data center.

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.

Why Sell IBM System x

- Take advantage of IBM Business Partner only promotions, like the Solution Accelerator Initiative, and large soft dollar and discount programs.
- Differentiate yourself by selling the number one global IT brand with 19 years as top U.S. patent recipient.
- Sell servers rated first in client satisfaction by TBR for 12 of the last 16 quarters.
- Get support from 250,000 technical experts worldwide in more than 170 countries.

Innovation

Combining open, industry standards with our deep business experience and renowned research capabilities, System x and 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 high-end 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 High-end Systems

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. In today's business environment, enterprise computing solutions must be flexible to adapt to evolving day-to-day business requirements while providing exceptional performance, scalability, and reliability. The IBM eX5 portfolio, with systems, management, and support options, can solve for workload optimization, intelligent analytics, cloud and asset utilization, data center efficiencies, and IT economics.

Volume Systems

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 Blade Servers

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 diagnose a problem such as IBM predictive failure analysis and light path diagnostics to help preserve application uptime.

Dense Systems

Your clients' applications are demanding. HPC, cloud, imaging, and simulation workloads require extreme computational power. But with most IT budgets under constant pressure, their organizations also demand financial responsibility. To support these competing challenges, you need a scalable high-performance computing system that supports the highest possible computational performance coupled with simple management, all while offering energy efficiency and extraordinary density to help them conserve power and data center floor space.

Highlights include:

- Extraordinary performance for the most demanding applications
- Decrease data center footprint
- Easy to deploy, integrate, service, and manage.

Flexible 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.

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.

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 high-end servers with extra processor, memory, and I/O capacity that the competition can't match.

Save with IBM Energy Efficiency

The IBM X-Architecture platform equips System x and BladeCenter servers with technology to help your customers realize the inno-

vation to become more efficient so they can go green and start saving. Innovations include Calibrated Vector Cooling design to maximize air flow, Active Energy Manager to control power usage, IBM Rear Door Heat eXchanger that can remove 50,000 BTUs from a rack, and low-power memory, processors, and drives. And the iDataPlex 2U chassis design draws about one-third the typical fan power of a standard 1U server. All this engineering is designed to increase system reliability and availability while making the data center much more affordable to operate.

2

General System x and BladeCenter Resources

This chapter provides you with general information for IBM Business Partners 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 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.

More on the Web

- IBM PartnerWorld Web site home page
- IBM PartnerWorld news and newsletters
- PartnerWorld membership levels
- Join PartnerWorld

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.)

Top System x Resources on PartnerWorld

In this guidebook, we have summarized and provided direct links to a great deal of PartnerWorld information of interest to System x and BladeCenter Business Partners. As such, this 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. Some of the key System x and BladeCenter pages on PartnerWorld are listed in the "More on the Web" box.

More on the Web

- System x Business Partner Resource Kit
- System x Master Resource Kit
- System x Home Page
- BladeCenter Home Page
- IBM x86 Systems Solutions Resource Kit
- System x Industry Solutions
- System x and BladeCenter Configuration Tools
- System x and BladeCenter Sales Plays and Tactics

System x Specialty

The IBM PartnerWorld System x Specialty offers unique benefits to IBM 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 their competition.

More on the Web

- System x Specialty info on PartnerWorld

The criteria for the System x Specialty, Specialty Base, and Specialty Elite are available immediately and business partners are encouraged to begin preparing to meet these criteria and initiate the application process now.

System x Technical Vitality Skills Dashboard

The System x Business Partner Technical Vitality (BPTV) program helps you determine the skill level of your organization. The Web-based BPTV dashboard offers you guidance on the skill requirements and certification options needed to grow your skills and track your progress to become a System x Specialty partner.

BPTV Skills Dashboard provides:

- A customized GAP analysis showing point-in-time skill achievements mapped to the published IBM Specialty criteria.
- Easy-to-read color coded results highlighting achievements met, and criteria still needing completion (GAPs in skill criteria)
- A single consolidated report across all IBM brand and solution specialties, which can easily be shared with colleagues for longer term skill expansion and education planning.

BPTV Access: Your Authorized Program Administrator (APA) will have immediate access to BPTV. Your APA may allow additional employees to view the scorecard and dashboard by assigning them the "BPTV General" role in PPS. For additional information and assistance, contact PartnerWorld for guidance.

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

More on the Web

- Business Partner Technical Vitality (BPTV) Skills Dashboard tool (sign-in required)

System x product offerings will help you succeed. In this section, we discuss options for you to obtain the System x education you need.

Systems Connect eXpert

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

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

More on the Web

- Systems Connect eXpert Program

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

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 Systems College

IBM Systems College is your one-stop education resource for all STG brands including System x, BladeCenter, System z, Power, and Storage. Find the most current education as well as roadmaps, certification information, 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 long term. IBM Systems College also provides information on IBM skills mastery, mastery tests, and certifications.

More on the Web

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

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 Systems Connect eXpert offering described above. Or, attend an IBM conference event where classroom training opportunities are offered.
4. Register to take a test by contacting one of our worldwide testing vendors.
5. Take the test.
6. Repeat steps 3 through 5 until all required tests are successfully completed for the desired certification role.

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

Know Your IBM (KYI)

Know Your IBM is an 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.

More on the Web

- Know Your IBM training modules

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

Demand Generation Campaigns

IBM System x offers a number of demand generation campaigns designed for business partners. These programs are designed to help you accelerate sales of select IBM products and services to small, mid-size, and enterprise businesses. These offerings are supported by IBM investments in incentive programs, education, and demand generation support to help you generate leads.

Express Seller Program

To help simplify and accelerate your customer sales opportunities and joint marketing with IBM, you can take advantage of IBM Express Seller. Express Seller can help you sell select midmarket offerings that are supported with IBM-led demand-generation and in-market awareness tactics and campaigns. With the product offering available through Express Seller, you can enjoy many benefits, including:

- Everyday low price per unit of one
- Readily available stock for fast delivery to you and your customers
- Offerings that meet the "sweet spot" of customers' needs and address pain points.

Additionally, Express Seller helps you easily and cost-effectively launch marketing execution by offering Demand Generation Flex Asset kits which provide headlines, copy, product images, and product descriptions that can be used in your own marketing campaigns, while also providing co-marketing campaign assets which can be accessed and customized in IBM's Co-Marketing Center (CMC) Tool. At the same time, IBM's demand generation and advertising campaigns help you target midmarket customers by driving awareness to the market that IBM has offerings designed and priced for mid-size businesses

More on the Web

- IBM Express Portfolio
- Midmarket ready offerings
- Express Seller Toolkit

Essentially, Express Seller takes the most popular IBM offerings for the midmarket and packages them to simplify your sales play, while providing you the resources to help you be successful selling IBM products to mid-size businesses.

Smarter Computing Volume Systems

Smarter Computing is IBM's approach to IT innovation in an information-centric era. It helps IT leaders seize the opportunities of a

smarter planet by thinking differently about the way organizations can leverage cloud, unlock the power of big data, and secure critical information.

The Volume Systems campaign encompasses a broad portfolio of high value, scalable, feature-rich System x and Technical Computing solutions that are easy to deploy and manage. It not only reduces TCO, but increases business productivity with feature-rich innovation that differentiates it from the competition.

More on the Web

- Smarter Computing Home Page
- Smarter Computing Asset Library
- Smarter Computing Large Enterprise Portal
- IBM Co-marketing Center

Start using the Volume Systems campaign tools today to demonstrate to your customers how to:

- Increase IT efficiency through consolidation, improved business continuity, via virtualization and cloud
- Improve decision making support with increased performance of BI, CRM, ERP, and DB.

Sales Resources

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

More on the Web

- System x performance benchmarks
- BladeCenter performance benchmarks

More on the Web

- System x and BladeCenter blog
- DeveloperWorks forum for IBM BladeCenter
- IBM Systems Director forum
- IBM System Storage forum
- Linux forum
- Linux tech support forum
- Expert Connect System x certification community
- IBM Cloud Computing community
- IBM x86 servers on Facebook
- IBM x86 servers on YouTube
- x86 servers on Twitter
- Twitter search results for IBM System x
- Search Twitter for mentions of your business or competitors
- Google blog search results for IBM System x or BladeCenter
- Search blog for mentions of your business or competitors
- LinkedIn social network (has an IBM Business Partner Group)
- Use Twitter to Grow Your Business (IBM Software Business Partner Blog)
- VMworld

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

More on the Web

- System x and BladeCenter success stories

Customer testimonials (multiple videos)

Success Stories, References, Case Studies

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

Additionally, we invite you to nominate clients you have helped succeed 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 below.

Competitive Marketing Information

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

More on the Web

- IBM "COMP" Web site
- IBM System x Competitive Sales Tool
- IBM Systems Consolidation Evaluation Tool

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.

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

More on the Web

- Web content syndication

Pre Sales Information at Your Fingertips

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, configuration and options guidance, competitive information, and access to our online configurator, or link to the download configurator SSCT. A public site for PSAT is also available for customers.

More on the Web

- Pre-Sales Advisor Tool (configs, tools, resources)
- Public version of PSAT

Playbook/Sales Kits for System x and BladeCenter

This IBM Playbook includes a great selection of System x and BladeCenter plays to help you generate new opportunities in your territory. Each play focuses on a set of common client pain points

and recommends specific solutions to address them. To offer your clients more complete solutions, make your deals more profitable, and increase your win odds, you'll also want to check out the sections on financing, services, and storage.

More on the Web

- Playbook for System x and BladeCenter

Server Configuration Tools

IBM has created several tools to help you configure specific server solutions as necessary to get pricing and place an order. There are tools (wizards, PDF files, spreadsheets, etc.) that help you configure System x servers, BladeCenter servers, 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

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

3

How to Win with System x and BladeCenter

This chapter provides you with guidance on how to win in the marketplace with System x and BladeCenter offerings.

Understand Your Customer

Reach Out Early in the Sales Cycle

Before you can propose a System x offering, you must first learn about your customer, their business, and their IT needs. You'll need to understand the following about your customer:

- Business strategy and priorities
- IT approval and buying process
- Measurement of success
- Current IT environment and priorities.

By starting the conversation early, you'll be able to talk to the right people about what matters most to their business. You'll propose the right set of products for their business challenges, and you'll be able to help influence their buying behavior to offer a complete solution.

Identify IT Pain Points

Once you understand your customer's overall strategy and priorities, dig deeper to build and position your solution around their IT pain points. These can include business or IT productivity, costs,

growth, or performance. These pain points drive the majority of their direction and decisions. They can be driven by external forces as businesses and their IT teams today are under tremendous pressure from multiple sides.

Offerings from IBM System x address the key business and IT pain points your customers are facing. System x servers offer the latest technologies with leading customer satisfaction and support. They are designed to deliver tremendous efficiency, ease of management, and performance to help you directly address the concerns of your customers.

Sell to the Decision Makers

In addition to understanding your client's pain points and related solutions, it's equally important to understand the needs and perspectives of your customer's key decision makers.

Selling to the CIO or IT Leader

The forward-thinking CIO or key IT leader in your customer's business is looking for ways to leverage current economic conditions to gain a competitive advantage. You'll need to show the CIO how a proposed solution can help the business do more with less. They also want to know how the solution can put them in a better position for future opportunities.

These leaders want to know that their solution comes from a vendor like IBM that has the experience to truly manage change. They want to have the information they need to lead their market and set the agenda.

Their concerns will be related to the value of the proposed offering so they will ask questions like the following:

- How can I better align IT with business objectives?
- How can I get more from my infrastructure while improving IT performance and reliability?
- How do I help my IT staff be more productive and eliminate bottlenecks?

- How do I reduce software licensing costs?
- How can I leverage key vendor partnerships for more value?
- How can I extend the global reach of the enterprise?

Selling to the CFO or IT Purchaser

When you are talking to the CFO or IT purchaser, you need to address three key issues: return on investment, clarity, and execution. They are looking for rapid return and will want to know how quickly this IT investment will pay off, how they can keep acquisition costs low, and available financing options.

Help show them this is the right time to invest by offering IBM System x solutions designed to keep costs down, both up front and over the long term. Show them with proof like the System x consolidation tool that you can help them meet business demand while managing cash flow.

Their concerns will related to the IT investment so they will ask questions like the following:

- How quickly will this IT investment pay off?
- How can we reduce acquisition costs?
- What are the financing options available to help me manage my balance sheet?
- Is this the right investment right now?

Respond to Customer Pain Points

Ask the right questions to showcase the advantages of the System x and BladeCenter offerings you have to offer.

Improve IT Productivity

Global economic conditions, limited staffing, competitive forces, and demanding users are pushing IT to deliver more than ever. IT departments are also dealing with the strain of maintaining older

systems and software. Often these systems are unreliable and unable to handle the increase in data, new services, and applications.

Offer efficient, reliable servers and solutions from IBM System x that are simple to manage. With System x and BladeCenter servers, your customers can potentially replace up to 24 of their old servers with just one that matches them in performance, so they have fewer software licenses and servers to manage.

Find opportunities to sell System x and BladeCenter offerings by asking your customers questions about IT productivity:

- Are you looking to reduce the number of servers you are managing?
- Do you have servers that are two to three years old?
- Has your IT infrastructure caused delivery of service to suffer?
- Have you experienced poor application performance because of overloaded databases?
- Have you been running on old systems regardless of their remaining warranty life?

Lower Costs

Though many of your customers want to update and upgrade their IT infrastructure, cost is as an overriding factor in their decisions. These customers focus on keeping costs to a minimum and have significant pressure to decrease capital costs (such as equipment) and operating costs (such as related space, power, cooling, and staff).

System x offers competitively priced offerings with an emphasis on overall cost reductions throughout the lifecycle.

System x technology can help keep costs low through energy savings, server consolidation, and increased productivity. IBM offers low-cost entry models and Express servers specifically designed and priced for your customers. Finally, IBM financing can give your clients room to maneuver financially and accelerate their IT investments.

Find opportunities to sell System x and BladeCenter offerings by asking your customers questions about lowering costs:

- Have you postponed upgrades due to budget?
- Are your operational costs, including power and cooling, out of control?
- Have you been running on old systems regardless of their remaining warranty life?
- Would you be interested in exploring creative ways to fund an IT acquisition, all within your budget?

Prepare for Growth

Your customers are facing an explosion of data from new sources, such as mobile users, business analytics, and increased instrumentation, which in turn is creating demand for solutions that require greater performance, efficiency, and cost effectiveness.

With System x, clients get solutions for their needs today and the flexibility to run their business tomorrow. They can scale their infrastructure to fit their business needs with virtualized servers, networking resources, and flexible solutions. And with eXFlash and slotless 10 GB Networking, System x business solutions give clients the technology they need to grow their business.

Find opportunities to sell System x and BladeCenter offerings by asking your customers questions about IT growth:

- Are you looking to expand?
- Are your workload requirements growing?
- Are you going through a merger or acquisition?
- Are you implementing new applications to learn about and track customer behavior?
- Are you adding new capabilities, workloads, or modules to your systems?

Deliver Higher Performance

Your customers are dependent on their IT department for running the business. This means concerns about business costs associated with system downtime, slow throughput, and response times. They need servers and technologies that efficiently use computing resources, and also maximize availability, throughput, and response time.

Offer your customers System x business solutions that help improve service levels by maximizing performance and throughput on reliable, secure platforms. System x servers are easy to manage and offer industry-leading performance.

Find opportunities to sell System x and BladeCenter offerings by asking your customers questions about their need for more performance:

- Do you struggle to quickly access and analyze all of your data?
- Has your IT department limited productivity or caused delivery of service to suffer?
- Has your business been affected by downtime or data loss?
- Is it difficult to get your systems back up and running quickly after downtime?

Make an Offer

Now that you understand your customer's requirements, it's time to put your skills to work for you.

Suggest Offerings from the Express Portfolio for Small Opportunities

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 the "Express" portfolio of offerings specially 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.

The IBM Express portfolio helps simplify and accelerate your customer sales opportunities and joint marketing with IBM. Express Seller can help you sell select midmarket offerings that are supported with IBM-led demand-generation and in-market awareness tactics and campaigns. With the product offering available through Express Seller, you can enjoy many benefits, including:

More on the Web

- Express Seller Toolkit

- Everyday low price per unit of one
- Readily available stock for fast delivery to you and your customers
- Offerings that meet the "sweet spot" of customers' needs and address pain points.

Run a Sales Play or Tactic

IBM System x and BladeCenter offer numerous sales plays and tactics so you have the latest resources to sell solutions and servers. Each sales play and tactic includes customer and seller presentations, links to additional resources, deal sizes, objection handling, and more. They are designed to organize the sales assets you want according to IBM solutions or offerings, bring together key information assets that make the sales process more efficient to help you close deals more quickly, and provide resources to answer additional solutions questions and provide access to technical assistance. Go to the Web site to see what is available today and pick the one best suited to your opportunity.

More on the Web

- System x and BladeCenter Sales Plays and Tactics

Send a Proposal

Get started quickly by using IBM Quick Proposal Templates that lay out IBM offerings in a proposal form that addresses common customer requirements. IBM Quick Proposal Templates are available for each product offering as well as product families. Check out the Quick Proposal Template tool to search for the one you need for your customer.

More on the Web

- IBM Quick Proposal Templates

Take Advantage of IBM Expertise

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:

More on the Web

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

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

- Sales strategy information
- Solution assurance assistance.

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

Grow Your Margins with IBM System x and BladeCenter

Attach Accessories and Upgrades to Your Proposals

There are many optional accessories and upgrades for all IBM System x and BladeCenter servers. These options include things like memory upgrades, processor upgrades, storage devices, racks, power solutions, networking devices, monitors, and input devices. Don't forget to include options that improve the value of the solution you are proposing to your customers. You will find a comprehensive listing of these options by following the links in the "More on the Web" box.

More on the Web

- System x accessories
- Tape storage

Attach Operating Systems to Your Proposals

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

More on the Web

- System x operating systems

Attach 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 servers with storage devices. Properly clothing a server allows you to offer a complete solution while also increasing your profits. IBM's line of storage devices falls under the System Storage brand and includes disk storage, tape storage, and storage management software.

The IBM System Storage DS3000 series product family replaces the IBM TotalStorage DS300 and DS400 disk systems. The award-winning DS3000 family of entry storage products is S.A.F.E.R—Scalable, Affordable, Flexible, Easy, and Reliable. It is scalable because you can grow to over 14 TB of capacity. It is affordable because it is an excellent value starting at just under $4,500 USD. It is flexible because the DS3000 series attaches to System x, BladeCenter, and select third-party servers, making it perfect for a mixed-vendor environment. It is easy because the DS3000 Storage Manager (included at no charge) makes deployment and installation simple. It is reliable because the system comes from IBM, one of the most trusted vendors in the industry. With the new DS3000 series family, you get the same outstanding quality and support that you have come to expect from IBM's DS family of disk storage systems. The DS3000 series offers both direct-attach and SAN-attach models.

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

More on the Web

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

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.)

Attach Services to Your Proposals

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.

Help Your Customers Finance Their Purchases

IBM Global Financing (IGF) continues to focus on meeting customer needs by concentrating on key business areas: leasing and lending, remarketing and refurbishing, and asset management. IGF conducts business in more than 40 countries, financing IBM and non-IBM hardware, software, and services, with a full range of flexible, low-rate offerings. IGF's customers find that financing their information technology solutions offers many advantages in both robust and difficult economic climates because financing frees up their capital for other investments. Many information technology installations, including those for customer relationship management, data mining, and e-business, require a substantial investment. IGF financing enables customers to pay for their new technology in affordable monthly payments during the life of the project. Our customers run the gamut from the smallest, family-owned business purchasing a single server and software to the largest, multinational corporation, acquiring tens of thousands of PCs for offices on several continents. In addition to working directly with customers, we work with IBM Business Partners to provide financing for their clients and to help them build their own businesses.

More on the Web

- IBM Global Financing

4

System x Solutions

Increasingly, infrastructure decisions are being made in a solution context. System x has a number of solutions through IBM or business partners that help customers derive more business value and speed time to deployment.

For you as a business partner, solutions help further differentiate the IBM offering from the competition and establish you the partner as a trusted total solution provider rather than a commodity parts supplier. In fact, based on historical analysis, IBM System x/BladeCenter Business Partners who also sell value-added solutions had a 60 percent higher win rate, and a 9 percent higher average unit revenue, than those that did not.

More on the Web

- System x solutions
- IBM System x Solutions Resource Kit
- System x Solutions eGuide Tool

Virtual Desktop Infrastructure (VDI)

Like server virtualization, desktop virtualization helps IT managers easily manage, secure, and deploy technology and reduce costs. And today's mobile users require more consistent, security-rich access to files and applications from a variety of user devices—tablets, laptops, smartphones, and more. Desktop virtualization can help you meet these demands with flexibility, choice, and self-service for your employees.

SmartCloud Desktop Infrastructure Solutions for VDI

In a recent IDC study, nearly half of the respondents said they completed or were completing desktop virtualization deployments.[1]

IBM SmartCloud Desktop Infrastructure, the IBM solution for desktop virtualization, offers a choice of robust virtual desktop solutions based on a reference architecture approach designed in close cooperation with Citrix, VMware, and Microsoft. The solutions are powered by IBM System x servers and are fully tested across applications, software, hardware, and services to help streamline IT administration and simplify the transition to a virtual desktop infrastructure (VDI).

More on the Web

- SmartCloud Desktop Infrastructure details on PartnerWorld
- SmartCloud Desktop Infrastructure info on IBM.com
- SmartCloud Desktop Infrastructure blog search
- SmartCloud Desktop Infrastructure Twitter search

IBM SmartCloud Desktop Infrastructure can help you:

- Simplify desktop administration, support, and management
- Enhance security and compliance management and improve availability and reliability
- Provide flexibility so users can work anytime, anywhere regardless of location or device
- Better support growth initiatives for mobility and flexible work locations.

Source: (1) Worldwide Network Consulting and Integration Services 2009–2013 Forecast and Analysis: Opportunities Due to Server Virtualization, IDC, June 2009.

Cloud Computing and Virtualization

Your customers, partners, and employees are placing new demands on your IT every day. Building on the benefits of server

virtualization, cloud computing can give you the flexibility to meet these demands, improving resource utilization to help you make your business processes more efficient. With the right hardware and software, a cloud computing infrastructure can help lower costs and improve return on your IT investment.

SmartCloud Entry

IBM SmartCloud Entry is a robust cloud 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 SmartCloud Entry is a robust cloud that works with IBM BladeCenter Foundation for Cloud, IBM Ready Pack for Cloud, and select IBM Flex System, System x, and BladeCenter servers. Also, the IBM PureFlex System is integrated with IBM SmartCloud Entry for easy cloud-ready deployments.

More on the Web

- SmartCloud Entry details on PartnerWorld
- SmartCloud Entry Sales Kit
- SmartCloud Entry details on IBM.com
- SmartCloud Entry blog search
- SmartCloud Entry Twitter search

Here are some quick SmartCloud Entry 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 and Ready Pack for Cloud, and other Flex System/System x platforms

- Integrated in the IBM PureFlex System for easy cloud deployment
- Optimizes the data center with increased automation, structured security, comprehensive management, and resource sharing
- Offers metering tools to develop usage and billing models to track ROI
- Supports VMware, Hyper-V, Kernel-based Virtual Machine (KVM), as well as PowerVM.

Cloud Solutions

IBM Integrated Offering for Cloud provides a comprehensive, easy-to-use, entry-level private cloud solution based on IBM System x3650 M4 servers integrated with IBM SmartCloud Entry software, storage, networking, and platform management.

More on the Web

- IBM Integrated Offering for Cloud details on PartnerWorld
- IBM Integrated Offering for Cloud details on IBM.com

IBM ReadyPack for Cloud with IBM SmartCloud Entry enables the creation of a virtualized and cloud-enabled data center than can be tailored to fit your needs. SmartCloud Entry makes it simple for your end-users to request and deploy the resources they need in an automated, secure manner via an easy-to-use portal.

IBM BladeCenter Foundation for Cloud provides a comprehensive converged solution that brings together servers, storage, networking, management, software, and services needed to quickly estab-

More on the Web

- IBM ReadyPack for Cloud with IBM SmartCloud Entry details on PartnerWorld
- IBM ReadyPack for Cloud with IBM SmartCloud Entry Sales Kit
- IBM ReadyPack for Cloud with IBM SmartCloud Entry details on IBM.com

More on the Web

- IBM BladeCenter Foundation for Cloud details on PartnerWorld
- IBM BladeCenter Foundation for Cloud details on IBM.com

lish a robust and virtualized environment. This highly reliable and scalable platform can easily be extended to a private cloud with the addition of IBM SmartCloud Entry for System x software that includes leading edge self-service portal, automation, and metering.

IBM Virtualization Reference Architecture for Microsoft Hyper-V on System x provides small and mid-size businesses with an affordable, reliable, and highly available virtualization solution validated by the Microsoft Fast Track program on IBM x86 servers, Juniper Network Ethernet switches, and IBM System Storage DS3500 Express.

More on the Web

- IBM Virtualization Reference Architecture for Microsoft Hyper-V details on PartnerWorld
- IBM Virtualization Reference Architecture for Microsoft Hyper-V Reference Architecture
- IBM Virtualization Reference Architecture for Microsoft Hyper-V details on IBM.com

x86 Solutions for VMware

IBM and VMware can help you implement a reliable infrastructure with hardware and software designed for virtualization. As the first authorized reseller of VMware products, IBM offers the broadest portfolio of industry-standard x86 servers with the System x and BladeCenter servers that can help you lower IT costs with unparalleled performance, extraordinary

More on the Web

- IBM x86 VMware solution info on PartnerWorld
- IBM x86 VMware solution info on IBM.com

energy efficiency, and rock-solid reliability. Whether your business needs a virtual desktop solution or an enterprise-class server virtualization solution, IBM has you covered with innovative technology and exceptional services and support.

SAP

For 40 years, IBM and SAP have worked together to create powerful business solutions, delivering differentiating advantages that can help you align and integrate your processes, communicate with employees, partners, suppliers, and customers in new ways, improve efficiency, and fully utilize your IT investment to increase the value of your business. Whether your business supports a high-performance data center or a small office with limited IT skills, IBM offers a large portfolio of System x and BladeCenter servers for your diverse SAP workloads.

In this section, we will take a quick look at some of IBM's x86 solutions for SAP environments.

SAP HANA

SAP HANA, delivered on IBM eX5 enterprise servers with fifth-generation IBM Enterprise X-Architecture technology (eX5), helps

More on the Web

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

transform the enterprise by addressing current needs while delivering the robust scalability and performance needed to accommodate growth. SAP HANA running on powerful IBM eX5 high-end servers with Intel Xeon processor E7 family combines the speed and efficiency of in-memory processing with the ability to analyze massive amounts of business data—enabling companies to eliminate barriers between real-time events and real-time business decisions.

To support today's information-critical business environment, SAP HANA gives companies the ability to process huge amounts of data faster than ever before. The appliance lets business users instantly access, model, and analyze all of a company's transactional and analytical data from virtually any data source in real time, in a single environment, without impacting existing applications or systems.

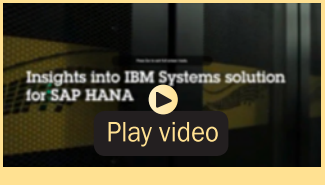
The result is accelerated business intelligence (BI), reporting, and analysis capabilities with direct access to the in-memory data models residing in SAP In-Memory Database software. Advanced analytical workflows and planning functionality directly access operational data from SAP ERP or other sources. SAP HANA provides a high-speed data warehouse environment, with SAP In-Memory Database serving as a next-generation, in-memory acceleration engine.

Here are some quick SAP HANA facts:

- SAP HANA running on IBM eX5 enterprise servers enables faster access to SAP operational data and information with near real-time visibility into business operations

More on the Web

- SAP HANA info on PartnerWorld
- SAP HANA info on IBM.com
- SAP HANA blog search
- SAP HANA Twitter search
- SAP HANA RedPaper



SAP HANA overview (7:25)

- Powerful and scalable IBM eX5 high-end servers powered by the Intel Xeon processor E7 family speed in-memory processing, enabling the analysis of massive amounts of business and operational data
- Workload Optimized Solutions for SAP HANA simplify ordering and deliver leading performance and scaling with faster deployment
- Simple, seamless scalability with the IBM General Parallel File System (GPFS) eliminates the need for external storage and enables high availability and disaster recovery.

Business Warehouse Accelerator

IBM and SAP offer an integrated solution that enables customers to deploy SAP NetWeaver Business Warehouse Accelerator (SAP NetWeaver BW Accelerator) in an easy, cost-effective way as a snap-in solution to an existing SAP NetWeaver BW landscape. Shipped with Intel Xeon processor-based servers, the IBM Systems solution for SAP NetWeaver Business Warehouse Accelerator offers users near real-time analytics when using SAP NetWeaver BW.

The IBM Systems solution for SAP NetWeaver BW Accelerator crunches through terabytes of SAP NetWeaver BW data in a matter of seconds, without the need for dedicated database administrators building and maintaining pre-defined aggregates or spending valuable time on query performance-tuning. IBM's automated High

More on the Web

- Business Warehouse Accelerator info on PartnerWorld
- IBM SAP Alliance overview on PartnerWorld
- Business Warehouse Accelerator details on IBM.com
- Business Warehouse Accelerator blog search
- Business Warehouse Accelerator Twitter search

Availability solution for SAP NetWeaver BW Accelerator allows customers to implement SAP NetWeaver BW Accelerator as a mission-critical system, at minimal effort using standard functionality.

Here are some Business Warehouse Accelerator facts:

- Query processing up to 200 times faster than traditional approaches.
- Smart data compression combined with in-memory processing and search engine-based parallel processing delivered with unmatched scalability, offering increased speed, flexibility, and business insights.
- Turbo-charged insights and decision support that empowers SAP NetWeaver BW users.

SAP Discovery System

The IBM Systems solution with SAP Discovery system can help businesses speed development and deployment of new SAP applications, including SAP HANA. The IBM Systems solution with SAP Discovery system combines robust IBM hardware built on the Intel Xeon processor E5 family, a wide range of preinstalled SAP software, and a variety of demonstrations, examples, and hands-on exercises. The IBM Systems solution with SAP Discovery system offers a fast, easy, and cost-effective way to explore, evaluate, and train on SAP products before deploying new software on your infrastructure.

More on the Web

- SAP Discovery System info on IBM.com
- SAP Discovery System info on PartnerWorld

The IBM Systems solution with SAP Discovery system uses the IBM System x3650 M4 server to provide a robust, compact, and cost-effective hardware platform for evaluating SAP software in a virtual environment using VMware ESXi software with Microsoft Windows and SUSE Linux operating systems. IBM System x3650

M4 servers offer an energy-smart, affordable, and easy-to-use rack solution for data center environments looking to significantly lower operational and solution costs. Built on the latest eight-core Intel Xeon processor E5 family, x3650 M4 two-socket servers offer a highly available, growth-flexible, and virtualization-capable hardware platform that can support the demanding workloads of a SAP implementation, even in a constrained data center. The x3650 M4 can be equipped with up to 18 memory modules, providing enhanced memory bandwidth and intelligent processing that deliver up to 54 percent better SAP application performance than the previous-generation server.

Here are some quick SAP Discovery System facts:

- Get quick access to a complete SAP environment for development, training, and proof-of-concept exploration activities
- Integrates a full range of preinstalled SAP software, development tools, and IBM DB2 to minimize risk, reduce costs, and accelerate implementation
- Built on the high-performance, energy-efficient and cost-effective IBM System x3650 M4 server, powered by the Intel Xeon processor E5 family
- Designed to help users of SAP software evaluate, upgrade, prototype, and train in a risk-free environment.

Big Data

Reference architecture solutions for big data analytics from IBM are easy to order, easy to implement solutions. They include IBM hardware, software, and services along with a standardized blueprint created from IBM enterprise experience and expertise. You can quickly deploy these cost-effective remedies to analyze data at rest, which is stored data such as databases, or data in motion, like streaming data, or both. The solutions are built around powerful, affordable, scalable IBM System x servers and IBM System Networking solutions combined with IBM InfoSphere BigInsights

and InfoSphere Streams software, so you can deploy proven solutions quickly.

Reference architectures for big data analytics provide technical blueprints that include a well-defined scope, a complete listing of requirements, and architectural decisions proven in the field including IBM Intelligent Cluster that helps make complex solutions simple. A reference architecture provides the value of synergy among each of the solution building blocks, with the flexibility needed to meet your requirements.

InfoSphere BigInsights takes open source Apache Hadoop and adds the enterprise-class functionality and integration necessary to help meet your critical business requirements. It provides a thoroughly tested and integrated solution that combines the benefits of leading-edge technologies with mature, enterprise-ready features. Organizations can run large-scale, distributed analytics jobs on clusters of cost-effective server hardware. This infrastructure leverages Hadoop's MapReduce framework to tackle very large data sets by breaking up the data across many nodes and coordinating data processing across a massively parallel environment.

More on the Web

- Big data solutions info on IBM.com
- Hadoop InfoSphere BigInsights info on PartnerWorld
- InfoSphere Streams info on PartnerWorld

Here are some quick big data reference architecture facts:

- Accelerates time-to-value with scalable, factory-integrated solutions
- Performs low-latency analysis on large volumes of stored or streaming data
- Analyzes data in its native format using IBM InfoSphere software
- Uses deep architectural services for rapid deployment and tuning.

Reference Architecture for Hadoop: Cloudera

IBM System x provides Cloudera-certified reference architectures for Apache Hadoop environments based on CDH, Cloudera's Hadoop distribution. The Cloudera-certified reference architecture solution from IBM for Hadoop big data analytics is an easy to order, easy to implement solution. It includes IBM System x hardware certified with Cloudera software and services along with a standardized blueprint based on IBM enterprise experience and expertise. You can quickly deploy this cost-effective business analytics solution to analyze data at rest, which is commonly stored in databases. This reference architecture is built around powerful, affordable, scalable IBM System x servers and IBM System Networking solutions so you can deploy your Cloudera-certified solution faster.

More on the Web

- Hadoop/Cloudera info on IBM.com
- Hadoop/Cloudera info on PartnerWorld

Reference architectures certified for Cloudera-based big data analytics provide technical blueprints that include a well defined scope, a complete listing of requirements, and architectural decisions proven in the field. For further customer benefit, IBM has the ability to deliver reference architectures in preconfigured hardware platforms. These reference architectures provide the value of synergy across each of the solution building blocks, with the flexibility needed to meet your requirements.

Here are some quick Hadoop/Cloudera reference architecture facts:

- Accelerates time to value with faster ordering and quicker deployment
- Delivers tested configurations for Cloudera distribution of Apache Hadoop environments
- Performs low-latency analysis on large volumes of data

- Cost-effectively deploys on easy-to-use, scalable IBM System x servers
- Offers a preconfigured hardware platform from IBM
- Includes deep architectural services for rapid deployment and tuning.

IBM System x Reference Architecture Hadoop: MapR

IBM is expanding its big data platform to run with multiple distributions of Apache Hadoop with MapR, a leading provider of Apache Hadoop distributions. MapR M5 Edition is the latest distribution to be validated on System x M4 reference architectures. MapR M5 is an enterprise grade complete Hadoop Distribution that connects directly to clients' existing systems and includes unique MapR M5 features including NFS Access, Snapshots, Mirroring, and Job Scheduler High Availability, making five "9" uptime possible.

More on the Web

- Hadoop MapR info on IBM.com
- Hadoop MapR info on PartnerWorld

The new MapR Reference Architecture for System x M4 illustrates recommended sizes and configurations and has been validated and baked on this IBM System x reference architecture.

IBM System x Reference Architecture for SAS Visual Analytics

SAS Visual Analytics validation on the System x3550 M4 reference architecture provides in-memory processing integrated with Hadoop for a powerful, automated analytics system for fast visualization of data. The solution combines one of the industry's leading analytics capabilities with unique in-memory architecture, intuitive data exploration, Hadoop support/integra-

More on the Web

- IBM System x RA for SAS Visual Analytics info on IBM.com
- IBM System x RA for SAS Visual Analytics info on PartnerWorld

tion, and information-delivery options, including the mobile devices such as iPad. Targeted to current SAS clients who are looking for greater performance at the speed of thought.

Business Analytics

The analysis of data drives decisions in every business. And in our connected world, the amount of data is growing rapidly. Analytics is moving from business initiative to a business imperative. The right systems can help make sure information and analysis flows seamlessly to support real-time insight.

More on the Web

- IBM Smart Analytics System 5600 info on IBM.com
- IBM Smart Analytics System 5710 info on IBM.com
- IBM Smart Analytics Systems info on PartnerWorld

The IBM Smart Analytics System 5600 and 5710 are deeply integrated and optimized analytic offerings powered by highly reliable System x servers for organizations that need cost-effective, flexible, and powerful business-ready analytics solutions.

IBM Reference Configurations for Microsoft Fast Track Data Warehouse for SQL Server 2012

Working closely with Microsoft, IBM provides you with highly reliable, scalable reference architectures optimized and validated for Microsoft SQL Server 2012. The result—faster time to value with a choice of pre-tested configurations that allow you to select the right level of performance and scalability at the right price for your data warehousing needs.

More on the Web

- IBM Reference Configurations for Microsoft Fast Track Data Warehouse for SQL Server 2012 info on IBM.com
- IBM Reference Configurations for Microsoft Fast Track Data Warehouse for SQL Server 2012 info on PartnerWorld

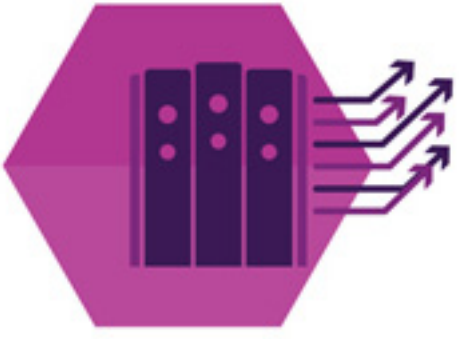
Data Management

In today's demanding workforce, your business requires continuous and immediate access to information. IBM systems experts work with IBM software engineers and leading database vendors like Microsoft, Oracle and SAP so that IBM System x, BladeCenter and System Storage offerings are optimized to manage data from the smallest of departments to large-scale enterprise data warehouses reliably and economically for a dynamic, scalable infrastructure that helps you respond quickly to changing business demands.

IBM Database Reference Architecture for Microsoft SQL Server on System x provides a flexible and cost effective platform for consolidating SQL Server workloads for departmental and small enterprise customers using IBM x86 servers, Juniper Networks Ethernet switches, Microsoft SQL Server and Sanbolic Melio software.

HPC and Technical Computing

Fluid dynamics, crash simulation, seismic processing, image comparison, and complex price modeling are challenging problems that place extraordinary demands on your IT. IBM offers a range of solutions for these challenges, including specialized high performance computing clusters, the innovative iDataPlex system, Graphics Processing Units (GPUs) and coprocessors, and workload and resource management software.



IBM System x GPFS Storage Server (GSS), available through the IBM Intelligent Cluster, is an integrated storage solution optimized to support high performance comput-

ing workloads and designed to let you start small and expand based on your workload needs.

More on the Web

- IBM System x GPFS Storage Server info on PartnerWorld
- IBM System x GPFS Storage Server info on IBM

Systems Management

According to IDC, 79 percent of total data center budgets are spent on management, administration, power, and cooling.[1] And, 64 percent of IT budgets are consumed with ongoing operations and maintenance instead of new strategic initiatives.[2] System x and PureFlex customers today need help in reducing these ongoing costs and in redirecting IT investment to new strategic initiatives.

Fortunately, IBM can help. IBM systems management solutions for PureFlex, Flex System, System x and BladeCenter have been proven to reduce systems administration cost by up to 35 percent, and reduce data center energy costs by up to 20 percent. One customer reduced IT management workload by 30 percent, freeing the IT team to focus on more valuable activities.[3]

More on the Web

- IBM systems management solutions for System x

For Business Partners, IBM systems management solutions help further differentiate the IBM offering from the competition and establish you the partner as a trusted total solution provider rather than a commodity parts supplier. In fact, based on historical analysis, IBM System x/BladeCenter business partners who also sell systems management and related value-add had a 60 percent higher win rate, and a 9 percent higher average unit revenue, than those that did not.

IBM's systems management solutions include:

- IBM Flex System Manager is the systems management offering for PureFlex and Flex Systems. Flex System Manager lowers costs and simplifies operations by managing server, storage, and network elements together. A user interface (including available options on Apple iOS, Google Android OS, and RIM BlackBerry OS) is easy to use and lets administrators work from a wide variety of devices and locations. Configuration patterns enable simpler and faster configuration and deployment by capturing and automating deployment parameters.

- IBM Systems Director Standard Edition is the systems management offering for System x and BladeCenter servers. Systems Director is an integrated service management solution to help simplify IT operations and reduce costs

- For PureFlex, Flex Systems, System x, and BladeCenter, IBM Upward Integration Modules complement Flex System Manager and Systems Director, and allow management of IBM servers through Microsoft System Center and VMware vCenter. The Upward Integration Modules are available on their own, and are also included in Systems Director Standard Edition.

- At the single chassis level for Flex System and BladeCenter, IBM Fabric Manager (the follow on to BladeCenter Open Fabric Manager) manages interconnects for better administration and node/blade failover. It is included with Flex System Manager. It can also be sold standalone for Flex System customers who do not purchase Flex System Manager, and for BladeCenter customers.

- Finally, for single System x servers, the IBM Integrated Management Module Advanced (IMM Advanced) is an upgrade to the free IMM included with most System x servers. The advanced upgrade provides valuable remote presence capability for System x servers.

Figure M.1 summarizes the portfolio and illustrates when to lead with each offering.

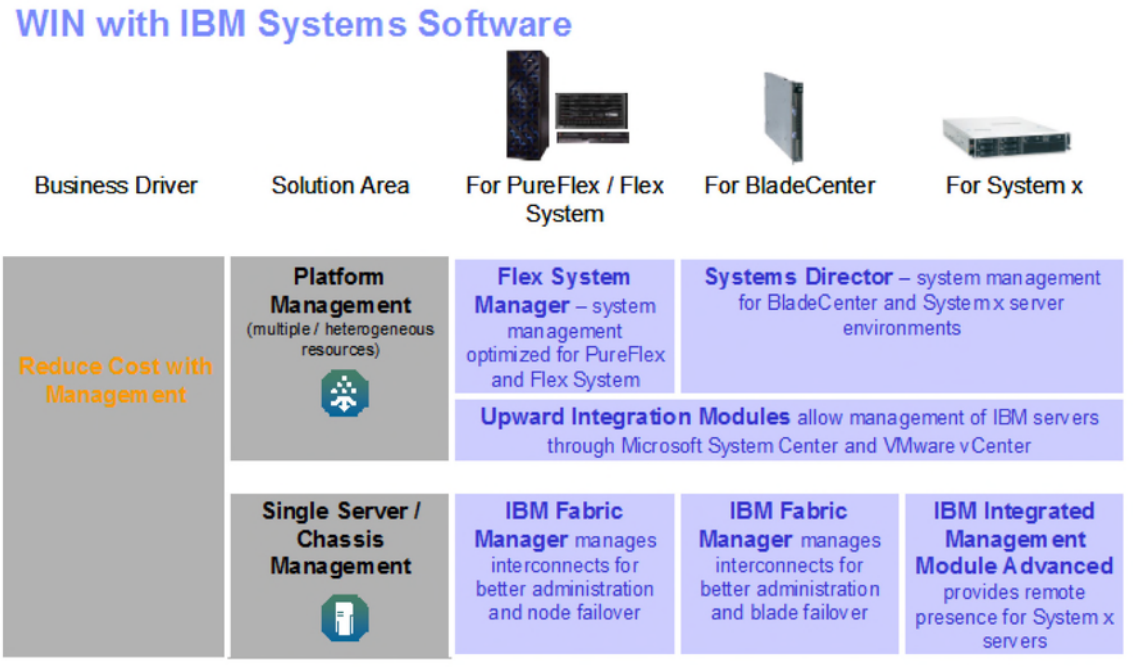


Figure M.1 Summary of IBM systems management solutions.

Sources: 1) IDC Market Analysis Perspective: Worldwide Datacenter Trends and Strategies 2013, Michelle Bailey and Katherine Broderick; 2) Forrester Research, Inc. "2013 IT Budget Planning Guide," October 7, 2010 by Craig Symons; 3) IBM Customer Reference database.

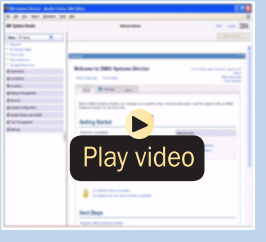
IBM Systems Director

IBM Systems Director (Figure S.1) is an easy-to-use point-and-click platform management tool that is authorized for use with IBM systems. It streamlines the way physical and virtual systems are managed across multiple operating systems and virtualization technologies across IBM and non-IBM platforms.

IBM Systems Director helps administrators automate data center operations. Built-in automation capabilities enable IT administrators to schedule updates and configuration changes to proactively avoid problems, and reduce the administrative burden of routine maintenance. Featuring simplified discovery and auto-

Express Edition provides an affordable foundation for systems management. It provides the integrated tools needed to efficiently visualize and communicate the relationships of physical and virtual systems that are discovered, monitor their health, define and receive threshold alerts, and update system firmware and operating environments.
Standard Edition includes all the capabilities of the Express Edition, and adds advanced deployment, monitoring, and management features under the same console. With Systems Director Standard Edition, you can create and deploy virtual images that encapsulate an operating environment as well as any middleware and applications, while automatically configuring the storage attached network.
Enterprise Edition includes all of the capabilities of the Express and Standard editions plus adds tools for more comprehensive availability and performance management. It also provides more options for rapidly deploying and maintaining virtual server environments. With the Enterprise Edition, clients have the flexibility to deploy workloads in virtual machines as well as deployment into a pool of virtual system resources across multiple physical servers (called "system pools").
VMControl helps you gain more from infrastructure wide virtualization, with cloud-ready management. The combination of IBM Systems Director and VMControl allows you to reduce the total cost of ownership of your virtualized environment—servers, storage, and networks—by decreasing management costs, increasing asset utilization, and linking infrastructure performance to business goals.

- Systems Director info on PartnerWorld
- Systems Director info on IBM.com
- Systems Director VMControl info on IBM.com
- Systems Director detailed info on Infocenter
- Systems Director Wiki
- Systems Director Redbooks



IBM Systems Director YouTube Channel

Figure S.1. IBM Systems Director editions (and links to more detail).

mated configuration, compute resources can be quickly added for management. Powerful grouping capabilities with nesting of resources help organize resources for efficient operation. A simplified interface is used to create action plans for events that can trigger automatic responses such as email notification or task execution.

To help drive system compliance and consistency, the update management feature can automatically notify users of out-of-date

systems and provide simplified tasks to download and install updates.

Here are some quick Systems Director facts:

- Unifies the essential management of IBM servers, storage, and network devices, delivering a consistent look and feel for common management tasks that reduces operational complexity
- Integrates IBM's best-of-breed virtualization capabilities to provide new ways to simplify the management of physical and virtual platform resources
- Reduces energy costs and usage by monitoring and managing the energy and cooling needs of servers and storage
- Easy integration with enterprise service management tools from Tivoli as well as other third-party providers
- IBM Systems Director Editions provide options to select the level of leading management solutions based on your needs.

5

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.

Volume Systems

In this section, we look at the specific IBM System x models that use traditional Tower mechanical packaging. This packaging offers flexibility by providing internal expansion capability. Though most tower servers are intended to rest on the floor beside a user's desk, IBM also offers conversion kits that allow these servers to be used in industry-standard 19-inch racks.

More on the Web

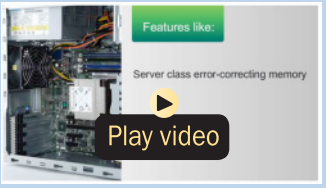
- Overview of all System x Tower servers

x3100 M4

With support for next-generation Intel Xeon and Core i3 processor technology, the IBM System x3100 M4 (Figure T.1) delivers strong performance for the price in a single-socket tower. Advanced features and functions, which come standard, include innovative integrated RAID capability, 1600 MHz 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.

- x3100 M4 specifications
- x3100 M4 details on PartnerWorld
- x3100 M4 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3100 M4 configuration details
- x3100 M4 options
- x3100 M4 blog search
- x3100 M4 Twitter search



x3100 M4 animated demo

Figure T.1. IBM System x3100 M4 at a glance (and links to more detail).

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.

x3300 M4

The IBM System x3300 M4 (Figure T.2) is a scalable, easy-to-use solution for customers in need of a powerful, affordable business server that can fit under their desk. The x3300 M4 embraces the "pay as you grow" philosophy to maintain an affordable entry price while allowing you to scale and configure the server to meet your needs. This dual-socket system comes standard with a single Intel Xeon E5-2400 series processor and room to add a second as needed. The Feature on Demand option makes it easy to unlock an expanded set of capabilities with optional activation keys. Storage flexibility includes support for both

- x3300 M4 specifications
- x3300 M4 details on PartnerWorld
- x3300 M4 details on IBM.com
- x3300 M4 Redbook Product Guide
- System x Competitive Sales Tool on COMP
- x3300 M4 configuration details
- x3300 M4 options
- x3300 M4 blog search
- x3300 M4 Twitter search

x3300 M4 animated demo

Figure T.2. IBM System x3300 M4 at a glance (and links to more detail).

2.5-inch and 3.5-inch hard drives, offering a total capacity of up to 24 TB of hot-swappable storage.

Here are some quick x3300 M4 facts:

- Meet capacity demand with a powerful, affordable server that is ready to grow
- Scale up quickly and easily with "pay as you grow" flexibility, including Feature on Demand upgrades
- Save money with low-voltage processors, high-efficiency power supplies, and remote management.

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 businesses. This two-socket server provides a balance of performance, high availability, expansion capability, and ease of management in a stable, long-life platform. The x3400 M3 includes features designed to achieve

- x3400 M3 specifications
- x3400 M3 details on PartnerWorld
- x3400 M3 details on IBM.com
- System x Competitive Sales Tool 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).

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.

Here are some quick x3400 M3 facts:

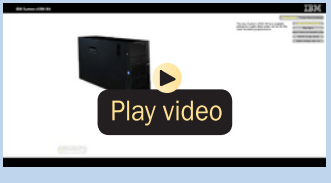
- Provides optimum performance and processing capability at a lower cost
- Offers large storage capacity and flexible configurations to scale as needs grow
- Helps reduce energy costs and ease management with efficient design.

x3500 M4

The IBM System x3500 M4 (Figure T.4) delivers reliable performance and optimized efficiency. The versatile 5U dual-socket x3500 M4 fits desk-side or in a rack enclosure. Designed for your business-critical applications, including analytics, cloud computing, SAP, and data management, the x3500 M4 meets your growing business or distributed enterprise needs. You can also use it as a retail store controller at a branch office, a distributed file/print server, or an all-in-one server for a remote office or business. Start with the basics and upgrade as your business changes without jeopardizing existing investments. Virtualizing your PC infrastructure into a single powerful server gives you access to secure and abundant storage space, while significantly reducing IT costs.

The x3500 M4 supports the latest Intel micro-architecture, 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

- x3500 M4 specifications
- x3500 M4 details on PartnerWorld
- x3500 M4 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3500 M4 configuration details
- x3500 M4 options
- Redbook: x3500 M4 Product Guide
- x3500 M4 blog search
- x3500 M4 Twitter search



x3500 M4 virtual tour

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

workloads and provide greater utilization, making the x3500 M4 a great choice for small and medium businesses.

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 Systems

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

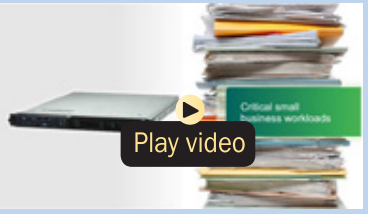
- Overview of all System x rack servers

x3250 M4

The IBM System x3250 M4 server (Figure R.1) 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 large capacity 1600 MHz memory, 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.

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

- x3250 M4 specifications
- x3250 M4 details on PartnerWorld
- x3250 M4 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3250 M4 configuration details
- x3250 M4 options
- x3250 M4 blog search
- x3250 M4 Twitter search



x3250 M4 animated demo

Figure R.1. IBM System x3250 M4 at a glance (and links to more detail).

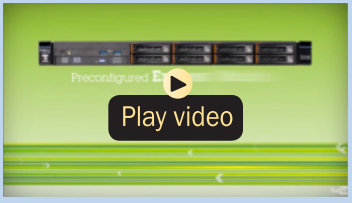
Here are some quick x3250 M4 facts:

- 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.

x3250 M5

The IBM System x3250 M5 server (Figure R.2) is the most compact rack server in the IBM System x portfolio. Designed in a single-socket 1U form factor, it supports double the system storage density of its predecessor in the same 22-inch deep chassis—four 3.5-inch hard disk drives (HDDs) or up to eight 2.5-inch SAS/SATA HDDs. Choose the latest Intel processor that best matches your workloads, whether Intel Xeon E3-1200 v3 series, Core i3, or Pentium, including Xeon Data Center Graphics processors. With increasing focus on data security, the included Trusted Platform Module (TPM) can help safely store cryptographic keys.

- x3250 M5 specifications
- x3250 M5 details on PartnerWorld
- x3250 M5 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3250 M5 configuration details
- x3250 M5 options
- x3250 M5 blog search
- x3250 M5 Twitter search



x3250 M5 overview (3:02)

Figure R.2. IBM System x3250 M5 at a glance (and links to more detail).

After activating the IBM Integrated Management Module 2 (IMM2) standard on your server, you can use IBM Feature on Demand (FoD) for several upgrades. For example, using FoD you can easily enable two more Gigabit Ethernet (GbE) ports, in addition to the two standard ports, without opening your system hardware. You can also upgrade the speed and security of the ServeRAID C100 RAID-5 upgrade within the FoD key activation system. Furthermore, by using FoD for upgrades, your two PCIe x8 expansion slots remain free for other IBM certified upgrade options as your business grows.

Here are some quick x3250 M5 facts:

- Enhanced performance advantages in a space-saving form factor
- Improved flexibility for faster, simpler expansion as you need it
- Entry-level server needs with IBM reliability, manageability, and value
- Groundbreaking system storage density in a 1U entry-level server

- Innovative technology with the latest processors and large memory capacity, in a compact 1U footprint
- Power-efficient and 80 PLUS-compliant design to help save energy costs
- Affordable price point and total cost of ownership.

x3530 M4

The IBM System x3530 M4 (Figure R.3) delivers dual-socket performance in a compact 1U footprint and features the latest Intel Xeon E5-2400 series technology with greater processing, memory, and I/O capabilities. Built with a focus on reduced total cost of ownership, the x3530 M4 provides 80-PLUS power supply certification to help enable energy savings. With a better balance between cost and system features, the x3530 M4 is an ideal platform for general business workloads.

Select configurations of the x3530 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.

- x3530 M4 specifications
- x3530 M4 details on PartnerWorld
- x3530 M4 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3530 M4 configuration details
- x3530 M4 options
- x3530 M4 blog search
- x3530 M4 Twitter search

x3530 M4 animated demo

Figure R.3. IBM System x3530 M4 at a glance (and links to more detail).

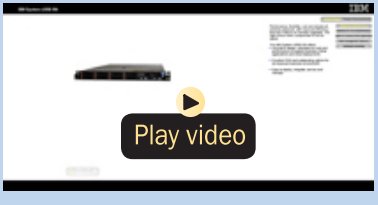
Here are some quick x3530 M4 facts:

- Offers more flexible configuration options and an easier upgrade path
- Balances energy-efficient performance with more affordable entry price and reduced total cost of ownership
- Helps deliver easier system management with industry-leading quality and reliability backed by IBM service and support.

x3550 M4

The IBM System x3550 M4 (Figure R.4) blends outstanding uptime, performance, and I/O flexibility with rock-solid reliability for business critical workloads, including cloud computing, virtual desktop, business analytics, high performance computing, and SAP. This compact rack server offers an energy-smart, easy-to-use solution with a pay-as-you-grow design to manage risks. With more computing

- x3550 M4 specifications
- x3550 M4 info on PartnerWorld
- x3550 M4 info on IBM.com
- System x Competitive Sales Tool on COMP
- x3550 M4 configuration details
- x3550 M4 options
- Redbook: x3550 M4 Product Guide
- x3550 M4 blog search
- x3550 M4 Twitter search



x3550 M4 animated demo

Figure R.4. IBM System x3550 M4 at a glance (and links to more detail).

power per watt, support for the latest Intel Xeon E5-2600 v2 series processors, and advanced memory support, the x3550 M4 offers balanced performance and density. It is ideal for a wide range of business critical applications, including cloud computing and virtualization. Big things do come in small packages.

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 proactively monitor the system's sub-components and 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. Light path diagnostics displays a visible warning light indicator on a failing component, allowing time for component replacement prior to failure and facilitating high availability.

Here are some quick x3550 M4 highlights:

- Two-socket, 1U rack server with innovative design, optimized for performance and reliability to support business-critical applications and cloud deployments
- Excellent reliability, availability, and serviceability (RAS) and outstanding uptime for an improved business environment
- Support for a wide range of business-critical applications, including cloud computing, virtual desktop, business analytics, High Performance Computing, SAP, and big data (as a management node)
- Easy to deploy, integrate, service, and manage.

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

- x3630 M3 specifications
- x3630 M3 details on PartnerWorld
- x3630 M3 details on IBM.com
- System x Competitive Sales Tool 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).

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

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.

x3630 M4

With support for the latest Intel Xeon processor technology, the IBM System x3630 M4 (Figure R.6) offers cost-optimized performance and memory with better energy efficiency. The x3630 M4 helps give growing businesses and branch offices a simpler, more affordable alternative to traditional enterprise offerings without sacrificing performance. For more storage-intensive workloads, the x3630 M4 can provide up to 42 TB of internal storage capacity.

Select configurations of the x3630 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 x3630 M4 facts:

- Helps reduce the cost of meeting general purpose and storage-intensive demands
- Offers more innovative design and flexible configurations for affordable growth
- Helps deliver enhanced reliability with simplified management backed by IBM service and support.

- x3630 M4 specifications
- x3630 M4 details on PartnerWorld
- x3630 M4 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3630 M4 configuration details
- x3630 M4 options
- x3630 M4 blog search
- x3630 M4 Twitter search

x3630 M4 animated demo

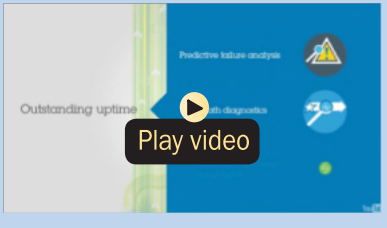
Figure R.6. IBM System x3630 M4 at a glance (and links to more detail).

x3650 M4

The versatile IBM System x3650 M4 (Figure R.7) blends outstanding uptime and performance for business-critical workloads, including cloud computing, virtual desktop and business analytics. The powerful server offers an energy-smart and easy-to-use rack solution with a pay-as-you-grow design to help manage risks. With more computing power per watt and the latest Intel Xeon E5-2600 v2 series processors, advanced memory support, and greater disk capacity for businesses requiring ample storage, the x3650 M4 offers balanced performance and density. Additionally, as the first x86 server to achieve the TPC-C benchmark, virtualized (1 M TPM),1 the x3650 M4 is optimized for cloud computing and virtualization applications.

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 proactively monitor the system's sub-components and provide advanced warning on power supplies, fans, VRMs, disks,

- x3650 M4 specifications
- x3650 M4 details on PartnerWorld
- x3650 M4 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3650 M4 configuration details
- x3650 M4 options
- Redbook: x3650 M4 Product Guide
- x3650 M4 blog search
- x3650 M4 Twitter search



x3650 M4 animated demo

Figure R.7. IBM System x3650 M4 at a glance (and links to more detail).

processors and memory. Redundant hot-swap components make it easy to replace failures without taking your system down. Light path diagnostics displays a visible warning light indicator on a failing component, allowing time for component replacement prior to failure and facilitating high availability.

Here are some quick x3650 M4 highlights:

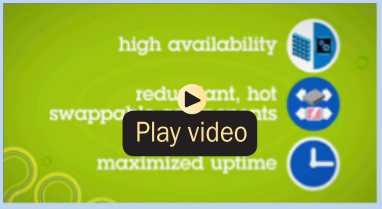
- Innovative design, optimized for performance and reliability
- Wide range of business-critical applications, including cloud computing, virtual desktop, and business analytics
- Optimized for cloud computing and virtualization
- Outstanding reliability, availability and serviceability (RAS) for an improved business environment
- Easy to deploy, integrate, service and manage.

x3650 M4 HD

The IBM System x3650 M4 HD high density storage server (Figure R.8) supports up to twenty-six 2.5-inch HDDs/SSDs or sixteen 2.5-inch HDDs/SSDs + sixteen 1.8-inch SSDs. The x3650 M4 HD is ideal for high-performance, storage-intensive applications, including data analytics or business-critical workloads. The x3650 M4 HD supports multiple RAID adapter configurations. Offering the latest Intel Xeon E5-2600 v2 series processors and advanced 1866 MHz memory support, the x3650 M4 HD delivers balanced performance and storage density. The powerful server offers an energy-smart, affordable pay-as-you-grow design to help lower costs and manage risks.

The x3650 M4 HD Storage Server blends outstanding uptime and rock-solid reliability. Predictive Failure Analysis proactively monitors the system's subcomponents and provides advanced warning on key components. Light path diagnostics displays a visible warning light

- x3650 M4 HD specifications
- x3650 M4 HD details on PartnerWorld
- x3650 M4 HD details on IBM.com
- System x Competitive Sales Tool on COMP
- x3650 M4 HD configuration details
- x3650 M4 HD options
- Redbook: x3650 M4 HD Product Guide
- x3650 M4 HD blog search
- x3650 M4 HD Twitter search



x3650 M4 HD overview (2:23)

Figure R.8. IBM System x3650 M4 HD at a glance (and links to more detail).

indicator on the failing component inside the system, allowing time for component replacement prior to failure and facilitating high system availability.

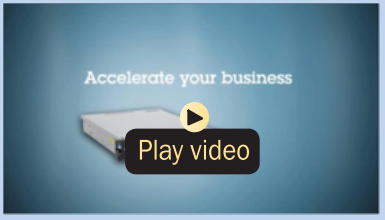
Here are some quick x3650 M4 HD highlights:

- 2U two socket high-density storage server featuring on-board 12 Gbps RAID controller
- Excellent reliability, availability, and serviceability (RAS) for an improved business environment
- Easy to deploy, service, and manage
- Ideal for data analytics, cloud computing, data management, and business-critical workloads.

x3750 M4

Within a dense 2U design, the IBM System x3750 M4 (Figure R.9) provides advanced features and capabilities. These include support for up to four sockets and 48 DIMMs, mix and match internal storage, up to 16 HDDs or 32 eXFlash SSD drives, six hot-swap dual rotor fans, two power supplies, and integrated 1 Gigabit Ethernet

- x3750 M4 specifications
- x3750 M4 details on PartnerWorld
- x3750 M4 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3750 M4 configuration details
- x3750 M4 options
- x3750 M4 blog search
- x3750 M4 Twitter search



x3750 M4 overview (2:41)

Figure R.9. IBM System x3750 M4 at a glance (and links to more detail).

(GbE) and 10 GbE networking with options for fiber or copper.

The x3750 M4 blends outstanding flexibility and expandability. The unique 2+2 socket design enables pay-as-you-grow processing and memory expansion to help lower costs and manage growth. The 5+3 PCIe socket design allows you to pay for I/O capabilities as needed. The x3750 M4's capabilities and performance allow clients to reduce total cost of ownership (TCO) by up to 52 percent over four years by consolidating multiple 2-socket servers into fewer 4-socket x3750 M4 servers.

Here are some quick x3750 M4 facts:

- Incorporates outstanding features and capabilities in an ultra-dense design
- Offers advanced flexibility and expandability to meet changing business requirements
- Balances processing power, memory, and I/O bandwidth to optimize productivity and performance.

High-end Systems

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

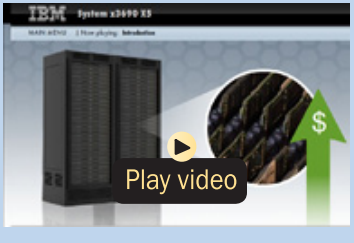
- Overview of all System x high-end servers

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.

The x3690 X5 features greater flexibility to help you meet changing workload demands as your business grows. With MAX5,

- x3690 X5 specifications
- x3690 X5 details on PartnerWorld
- x3690 X5 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3690 X5 configuration details
- x3690 X5 options
- x3690 X5 SAP HANA
- x3690 X5 blog search
- x3690 X5 Twitter search



x3690 X5 animated overview

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

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 customizable growth options offer freedom of choice. For example, you can add more memory without having to purchase unneeded processing capabilities.

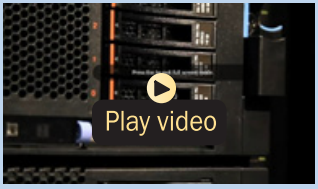
Here are some quick x3690 X5 facts:

- Designed for virtualization, database, and enterprise workloads
- Achieve four-processor performance at a two-processor investment
- 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 availability.

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, it offers ultimate flexibility to help you get what you need, when you 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

- x3850 X5/x3950 X5 specifications
- x3850 X5/x3950 X5 details on PartnerWorld
- x3850 X5/x3950 X5 details on IBM.com
- System x Competitive Sales Tool on COMP
- x3850 X5/x3950 X5 configuration details
- x3850 X5/x3950 X5 options
- x3850 X5 blog search
- x3850 X5 Twitter search
- SAP HANA



x3850 X5 at Acxiom (3:49)

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

performance for businesses that need timely answers to vital business questions.

The x3850 X5 server allows freedom of choice with extremely flexible configurations plus memory expansion capabilities. 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.

Dense Systems

In this section, we explore powerful platforms for compute-intensive workloads, including technical computing, grid, analytics, cloud, and more.

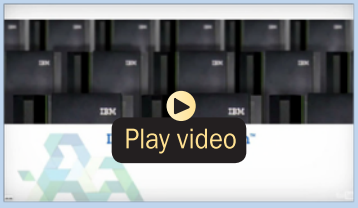
IBM NeXtScale System

IBM NeXtScale System (Figure E.3), an economical addition to the IBM System x family, offers an innovative approach to maximum usable density. Optimized to handle a number of workloads, all demanding agility, NeXtScale System helps drive business velocity by providing rapid procurement, deployment, and flexible options. This simple, yet powerful, system can handle applications ranging from technical computing, to grid deployments, to analytics workloads, to large-scale cloud and virtualization infrastructures.

Designed with industry-standard, off-the-shelf components, this general-purpose platform enables users to create a flexible, mix-and-match offering with compute, storage, and acceleration via graphics processing unit (GPU) or Intel Xeon Phi coprocessor. Customized solutions can be configured to provide an application-appropriate platform with choice of servers, networking switches, adapters, and racks.

This modular system is designed to scale and grow along with data center needs in order to protect and maximize IT investments. Since it is optimized for standard racks, users can easily mix high-density NeXtScale server offerings and non-NeXtScale

- NeXtScale System specifications
- NeXtScale System info on IBM.com
- NeXScale System info on PartnerWorld
- System x Competitive Sales Tool on COMP
- nx360 M4 Compute Node configuration details
- nx360 M4 Compute Node options
- NeXtScale System blog search
- NeXtScale Twitter search



NeXtScale overview (4:49)

Figure E.3. IBM NeXtScale System (and links to more detail).

components within the same rack. NeXtScale System also provides tremendous time-to-value by enabling users to get it up and running—and to the production phase—faster.

Extending the System x family to a larger range of users, the customizable, space-saving NeXtScale System comprises powerful compute nodes and an energy-efficient, low-cost 12-bay chassis.

This powerful server provides a dense, flexible solution with a low total cost of ownership. The half-wide, dual-socket NeXtScale nx360 M4 server is designed for data centers that require high performance but are constrained by floor space. By taking up less physical space in the data center, the NeXtScale server significantly enhances density. And it supports Intel Xeon E5-2600 v2 series up to 130 W and 12-core processors thus providing more performance per server. The nx360 M4 compute node contains only essential components in the base architecture to provide a cost-optimized platform.

Here are some quick NeXtScale System facts:

- Enable IT your way—Based on open standards, a single architecture for compute, storage, and acceleration to support a variety of workloads. All delivered your way: pre-integrated or roll your own.
- Deliver elegant simplicity—Simple architecture features independent, self-sufficient nodes with no single point of contention cross the entire system.
- Achieve extreme scalability—Designed to be run and managed at any scale, the system enables you to start small and scale rapidly as needed.

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:

- New Direct Water Cooled dx360 M4 servers power the fastest and most energy efficient x86 SuperComputer in the world
- 54 iDataPlex Systems listed in the latest Top 500 Supercomputer list (top500.org)
- 42 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 135 W processors, you can precisely balance your performance needs against energy usage. Up to two Intel Xeon Phi co-processors or NVIDIA GPUs can also be included as expansion options for those specialty workload needs. Networking choices include Ethernet 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.

- dx360 M4 specifications
- dx360 M4 details on PartnerWorld
- dx360 M4 details on IBM.com
- System x Competitive Sales Tool 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

Intelligent Cluster (Figure I.2) leverages decades of IBM experience to reduce the complexity of deployment with pre-integrated, delivered, and fully-supported solutions that match best-in-industry components with optimized solution design. With IBM Intelligent Cluster, clients can focus their efforts on maximizing business value, instead of consuming valuable resources to design, optimize, install, and support the infrastructure required to meet business demands.

Intelligent Cluster solutions feature industry-leading IBM System x servers, storage, software, and third-party components that allow for a wide choice of technology within an integrated, delivered solution. IBM thoroughly tests and optimizes each solution for reliability, interoperability, and maximum performance, so clients can quickly deploy the system and get to work achieving their business goals.

Here are some quick Intelligent Cluster facts:

- Complex solutions made simple
- Best-of-industry technology, optimized solution design
- Increase results through automation and built-in intelligence
- End-to-end solutions with end-to-end support by IBM.

- Intelligent Cluster specifications
- Intelligent Cluster details on PartnerWorld
- Intelligent Cluster info on IBM.com
- System x Competitive Sales Tool on COMP
- Intelligent Cluster blog search
- Intelligent Cluster Twitter search

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

6

Blades/Integrated Systems

In this chapter, we take a look at the Integrated and Blade systems used by businesses large or small and in virtually any industry.

Flex System

Organizations of all sizes need to improve IT efficiency to reduce operational expense and allow increased innovation. IBM Flex System solutions can help you consolidate your infrastructure and support innovative solutions such as social, mobile, and big data analytics. With IBM Flex System, you get the flexibility to innovate while still choosing the best architecture for your applications. And with recent announcements, you get even more choice, supporting consolidation efficiency across all infrastructure—not just servers—so you can reduce operational expense and free up resources for innovation.

IBM Flex System represents an entirely new generation of technology, with more performance and bandwidth, true integrated enterprise SAN storage, and far more capability to consolidate and virtualize than previous systems.

Businesses around the world have a timely opportunity to move forward beyond blade servers, transforming the data center by bringing together servers, networking, and storage—all under integrated management—with IBM Flex System.

Your business needs an infrastructure solution with a flexible architecture to support your needs today, but also designed to support multiple generations of future technologies. You need simple, integrated management to keep operational costs down, but you

also want a no-compromise design with long-term investment protection.

Whether you need to migrate an existing blade server infrastructure to simplify management and improve performance and flexibility, or implement new workloads, a converged infrastructure like IBM Flex System can meet your needs.

x240

Highlights

- Optimized for virtualization, performance, and highly scalable networking
- Embedded IBM Virtual Fabric allows breakthrough I/O flexibility
- Designed for simplified deployment and management.

To meet today's complex and ever-changing business demands, the IBM Flex System x240 compute node, an element of the IBM PureFlex System, is optimized for virtualization, performance, and highly scalable I/O designed to run a wide variety of workloads. The Flex System x240 is available on either your PureFlex System or IBM Flex System solution.

- x240 specifications
- x240 info on PartnerWorld
- x240 info on IBM.com
- IBM Flex System brochure (761KB)
- Data sheet (863KB)
- Product guide (x240 with Intel Xeon E5-2600 v2 family)
- Interoperability guide
- Configuration and Options Guide
- HW/SW compatibility

x440

Highlights

- Optimized for high-end virtualization and mainstream databases
- No compromise design with available 1.5 TB memory capacity and up to 64 virtual network adapters
- Designed for simplified deployment and management.

To meet today's complex and ever-changing business demands, the IBM Flex System x440 compute node, an element of the IBM PureFlex System, is optimized for high-end virtualization, mainstream database deployments, and memory-intensive high performance environments. The Flex System x440 compute node is a price-performance optimized 4-socket compute node with flexible I/O options to help you match system capabilities to workloads without compromise. With a dense design, the Flex System x440 compute node can help reduce floor space used, and lower data center power and cooling costs. The Flex System x440 is available on either your PureFlex System or IBM Flex System solution.

- x440 specifications
- x440 info on PartnerWorld
- x440 info on IBM.com
- IBM Flex System brochure (761KB)
- Data sheet (776KB)
- Product guide
- Interoperability guide
- Configuration and Options Guide
- HW/SW compatibility
- Virtual tour (IBM suggests using Java version 6 Update 12 or higher)

- x222 specifications
- x222 info on PartnerWorld
- x222 info on IBM.com
- IBM Flex System brochure (761KB)
- Data sheet (888KB)
- Virtual tour (IBM suggests using Java version 6 Update 12 or higher)
- Product guide
- Interoperability guide
- Configuration and Options Guide
- HW/SW compatibility
- Virtual tour (IBM suggests using Java version 6 Update 12 or higher)

x222

Highlights

- Optimized for virtual desktop and virtualization density
- Double-dense design that can support the equivalent of 28 nodes per IBM Flex System Enterprise Chassis
- Designed to reduce operational costs.

Today, only one in five organizations spend more than half of their IT budget on new hardware. That is because management and administrative costs have escalated to almost 70 percent of the average organization's current IT budget.

Even with that shift, business requirements continue to multiply—more virtual desktop users along with increased demand for virtualized resources such as cloud and test environments. As a result, IT executives must find new ways to satisfy user demand.

- x220 specifications
- x220 info on PartnerWorld
- x220 info on IBM.com
- IBM Flex System brochure (761KB)
- Data sheet (888KB)
- Product guide
- Interoperability guide
- Configuration and Options Guide
- HW/SW compatibility
- Virtual tour (IBM suggests using Java version 6 Update 12 or higher)

x220

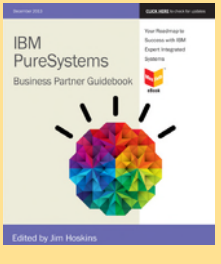
Highlights

- Optimized for infrastructure and entry virtualization workloads
- Simple virtualization solution with embedded dual hypervisors
- Designed for simplified deployment and management.

To meet today's complex and ever-changing business demands the IBM Flex System x220 compute node, an element of the IBM PureFlex System, has a versatile, cost-optimized design for infrastructure and entry virtualization workloads. The Flex System x220 is available on either your PureFlex System or IBM Flex System solution.

More on the Web

- IBM PureSystems Business Partner Guidebook



With Flex System x220, it is simpler than ever to get started. The Flex System x220 compute node features a no-compromise design for processor, memory, and networking resources to allow your business to do more. Features such as automated power management with onboard sensors give you more control over power and thermal levels across the system. These capabilities, combined with memory capacity up to 192 GB, are designed to help you get the most out of your systems.

For more details on IBM Flex System, please see the IBM Partner Guidebook for IBM PureSystems.

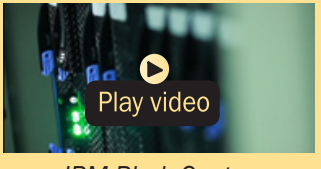
BladeCenter

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,

More on the Web

- Overview of BladeCenter servers

IBM BladeCenter: The right choice (6:55)



IBM BladeCenter Video Library

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

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

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

BladeCenter servers have four elements:

- Chassis—The mechanical enclosure that holds everything else, including various optional modules that fit into bays in the chassis to provide additional function. The chassis is designed to be installed in a rack.
- Modules—Components that are installed in hot-swap module bays provided in the BladeCenter chassis. These modules provide a number of common functions needed by the installed blades, the chassis, and the other modules. Modules include things like power supplies, systems-management modules, cooling fans, and network switches. IBM has published the specifications for the BladeCenter modules and options. This should result in a greater variety of options from a wider range of vendors than before.

- Blade servers—Processors, memory, and other circuitry packaged on a card that is installed in the chassis. The server blades used in BladeCenter are of two basic types: Intel/AMD processor-based, IBM POWER microprocessor-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 that make up the basic mechanical structure of a BladeCenter server.

BladeCenter S Chassis

The IBM BladeCenter S (Figure C.1) delivers 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

- BladeCenter S chassis details on PartnerWorld
- BladeCenter S chassis details on IBM.com
- BladeCenter Competitive Sales Tool 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).

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.

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
- 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
- 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.

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

BladeCenter E virtual tour

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

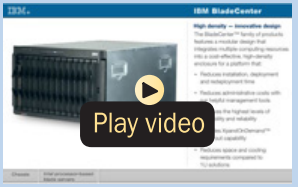
Here are some fast BladeCenter E facts:

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

BladeCenter H Chassis

The 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.

- BladeCenter H chassis details on PartnerWorld
- BladeCenter H chassis details on IBM.com
- BladeCenter Competitive Sales Tool on COMP
- BladeCenter H configuration details
- BladeCenter H options
- BladeCenter H blog search
- BladeCenter H Twitter search



BladeCenter H virtual tour

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

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 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 percent greater performance per watt compared to the competition.

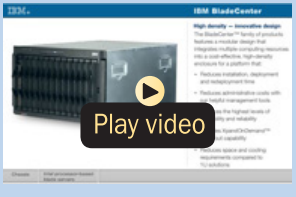
BladeCenter HT Chassis

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:

- 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

- BladeCenter HT chassis details on PartnerWorld
- BladeCenter HT chassis details on IBM.com
- BladeCenter Competitive Sales Tool on COMP
- BladeCenter HT (8740) configurations details
- BladeCenter HT (8750) configuration details
- BladeCenter HT (8740) options
- BladeCenter HT (8750) options
- BladeCenter HT blog search
- BladeCenter HT Twitter search



BladeCenter HT virtual tour

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

- 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.

x86 Blade Servers

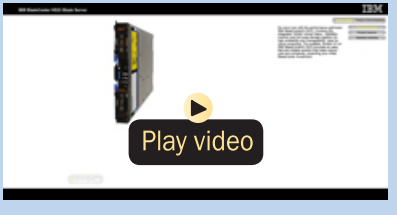
These blade servers are based on x86 processors by Intel (those with an "HS" prefix).

HS23

Do more in the data center you own with IBM BladeCenter HS23 (Figure H.1). This efficient server helps you manage big data and is ideal for a wide variety of workloads including virtualization and cloud infrastructure solutions. New integrated 10 GbE Virtual Fabric provides high networking bandwidth. Sixteen DIMM slots, supporting up to 512 GB of DDR3 memory, deliver more and larger virtual machines per blade compared to previous generations. Simplify infrastructure deployment and complexity 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.

- HS23 details on PartnerWorld
- HS23 details on IBM.com
- BladeCenter Competitive Sales Tool on COMP
- HS23 configuration details
- HS23 options
- Redbook: HS23 Product Guide
- HS23 blog search
- HS23 Twitter search



HS23 virtual tour

Figure H.1. IBM BladeCenter HS23 at a glance (and links to more detail).

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

Protect your investment by integrating the HS23 into your existing infrastructure. The HS23 is backward compatible with your existing BladeCenter chassis. It supports multiple technologies enabling zero rip-and-replace, and allows you to do more now or later as your business grows.

Here are some quick HS23 facts:

- Provides outstanding performance with the Intel Xeon processor E5-2600 product family and 1600 MHz memory
- Integrated Virtual Fabric 10 Gigabit Ethernet (GbE) to gain flexibility and easy scalability

HS23E

The IBM BladeCenter HS23E (Figure H.2) offers you flexible configuration options and provides you the energy efficiency and density you need. Combine the 12 DIMM slots, supporting up to 192 GB of DDR3 memory at 1600 MHz, with the integrated 1 Gigabit Ethernet (GbE) onboard for flexibility with value.

The HS23E offers value for performance, with support for the new 8-core Intel Xeon processor E5-2400 product family that processes up to 16 simultaneous threads and 1600 MHz memory. It is ideal for a variety of workloads such as business applications, virtualization, IT and web infrastructure, point of sale, and smart computing.

The HS23E is designed to help you be smarter about energy usage. It supports low-voltage processors and memory. The HS23E offers unbounded compatibility in all BladeCenter chassis, including BladeCenter E to provide density, optimize energy efficiency, and minimize power consumption.

- HS23E details on PartnerWorld
- HS23E details on IBM.com
- BladeCenter Competitive Sales Tool on COMP
- HS23E configuration details
- HS23E options
- HS23E blog search
- HS23E Twitter search

HS23E virtual tour

Figure H.2. IBM BladeCenter HS23E at a glance (and links to more detail).

The HS23E provides two ports of integrated 1 GbE and optional 4-port 10 GbE adapter for networking scalability. The option of software or hardware RAID provides flexibility to configure the HS23E to meet your business needs.

Select configurations of the HS23E 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.

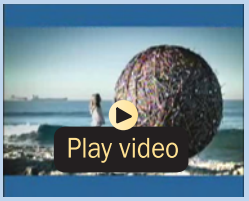
Here are some quick HS23E facts:

- An all-in-one, versatile blade that offers flexible configurations to meet your changing business needs
- Provides superior performance with the latest Intel Xeon processor E5-2400 product family and 1600 MHz memory.

HX5

Going beyond the industry standards with unique innovations from fifth-generation IBM X-Architecture technology (eX5), the new IBM BladeCenter HX5 (Figure H.3) enables unprecedented performance and utilization in a blade form factor for database and virtualization. With enhanced MAX5 scalability, the HX5 blade offers memory capacity of up to 1.2 TB—in a double-wide blade. The result is optimal server utilization with more virtual machines per system and larger and faster databases.

- HX5 details on PartnerWorld
- HX5 details on IBM.com
- BladeCenter Competitive Sales Tool on COMP
- HX5 configuration details
- HX5 options
- HX5 blog search
- HX5 Twitter search



IBM BladeCenter viral video (1:15)

Figure H.3. IBM BladeCenter HX5 at a glance (and links to more detail).

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 2- and 4-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 2- and 4-socket server needs

- 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 and PS701 and PS702 (Figure J.1) 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.

PS702 PS700 PS701

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.

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 4-core, 8-core, or 16-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

- BladeCenter Competitive Sales Tool on COMP
- PS700 Express details on PartnerWorld
- PS700 Express details on IBM.com
- PS700 Express Competitive Insights
- PS700 blog search
- PS700 Twitter search
- PS701 Express details on PartnerWorld
- PS701 Express details on IBM.com
- PS701 Express Competitive Insights
- PS701 blog search
- PS701 Twitter search
- PS702 Express details on PartnerWorld
- PS702 Express details on IBM.com
- PS702 Express Competitive Insights
- PS702 blog search
- PS702 Twitter search

POWER7 Chip animation

POWER7 overview (German)

Figure J.1. IBM BladeCenter PS700, PS701, and PS702 Express at a glance (and links to more detail).

- 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 down costs, reduce risk, improve energy efficiency, and enhance flexibility.

PS703 and PS704 Express

The IBM BladeCenter PS703 and PS704 Express (Figure J.2) 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.

- BladeCenter Competitive Sales Tool on COMP
- PS703 Express details on PartnerWorld
- PS703 Express details on IBM.com
- PS703 Competitive Insights
- PS703 blog search
- PS703 Twitter search
- PS704 Express details on PartnerWorld
- PS704 Express details on IBM.com
- PS704 Competitive Insights
- PS704 blog search
- PS704 Twitter search

BladeCenter PS703 virtual tour

Figure J.2. IBM BladeCenter H with PS Blades, PS703 and PS704 Express at a glance (and links to more detail).

Here are some quick PS703/704 facts:

- 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, IBM i, 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.

BladeCenter Open Fabric (I/O)

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

More on the Web

- BladeCenter Open Fabric info on IBM.com

BladeCenter Open Fabric Manager

IBM BladeCenter Open Fabric Manager software is designed to help you easily manage I/O and network interconnects by virtualizing network parameters such as the World Wide Name (WWN) and Media Access Control (MAC) addresses. When you replace a blade or failover from one blade in a chassis to another blade in a different chassis, the LAN and SAN configurations are not affected. Once installed, the utility is resident in the built-in Advanced Management Module (AMM) so you can pre-configure LAN and SAN connections—I/O connections are made automatically when you plug in a blade. No special tools or training are required; just manage with an easy-to-use Web-based user interface. And since this software can be deployed on both new and existing BladeCenter systems through firmware upgrades, you can protect your current BladeCenter investment and simplify I/O.

More on the Web

- BladeCenter Open Fabric Manager info on IBM.com
- BladeCenter Open Fabric Manager blog search
- BladeCenter Open Fabric Manager Twitter search

Here are some BladeCenter Open Fabric Manager highlights:

- Save time—pre-configure over 11,000 LAN and SAN connections once for each blade server
- Manage growth and complexity—up to 256 chassis and up to 3584 blade servers from a single Advanced Management Module
- Remain open with infrastructure flexibility—works with all Ethernet, Fibre Channel, and SAS switch modules; across all chassis and most x86 and Power processor-based blade servers
- Connect with ease—with a simple Web-based user interface based on IBM Systems Director 6.2 for easy server and switch set-up, deployment, and management
- Manage risk to keep your business running—available automated I/O failover to standby blades.

Virtual Fabric

As server virtualization technology becomes more prevalent within data centers, more dynamic performance is needed for network bandwidth to satisfy these demands. With our Virtual Fabric solution for IBM BladeCenter, IBM can help you break the I/O bottleneck by allowing you to allocate bandwidth where it's needed, delivering maximum application agility. Offering a full range of virtualization and convergence capabilities, the same network hardware can act as Ethernet, iSCSI, or Fibre Channel over Ethernet (FCoE) with bandwidths allocated in increments from 100 Mb to 1 Gb. The next-generation Virtual Fabric for IBM BladeCenter is the fast, flexible, easy, and reliable solution for I/O virtualization.

More on the Web

- Virtual Fabric info on IBM.com

Here are some overall Virtual Fabric facts:

- Requires up to 50 percent fewer adapters and up to 75 percent fewer switch modules

- Up to 64 percent lower energy consumption
- Simplified cabling and management
- Easily integrates into clients' existing setup (virtual or nonvirtual).

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

IBM BladeCenter Virtual Fabric 10 Gb Switch Module

The IBM Virtual Fabric 10 Gb Switch Module for IBM BladeCenter offers the most bandwidth of any blade switch and represents the perfect migration platform for clients who are still at 1 Gb outside the chassis by seamlessly integrating in the existing 1 Gb infrastructure. This is the first 10 Gb switch for IBM BladeCenter that is convergence ready (that is, able to transmit Converged Enhanced Ethernet (CEE) to a Fibre Channel over Ethernet (FCoE) capable top-of-rack switch). This new feature is available with firmware release 6.1 and newer.

In addition, this switch is a key part of the IBM Virtual Fabric offering, which allows clients to form up to eight virtual network interface controllers (vNICs) from one physical adapter (14 vNICs with an adapter plus the onboard 10 GbE controller with the BladeCenter HS23) and to manage them in virtual groups. This switch can be managed via a command-line interface (CLI) or a graphical interface of the switch, providing all the benefits of I/O Virtualization at 10 Gb speeds.

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

- Single-wide high-speed switch module

More on the Web

- IBM BladeCenter Virtual Fabric 10 Gb Switch Module Redbook info
- IBM BladeCenter Virtual Fabric 10 Gb Switch Module info on PartnerWorld

- Fourteen internal auto-negotiating ports: 1 Gb or 10 Gb to the server blades
- Interchassis redundancy (Layer 2 and Layer 3)
- 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
- Stacking support up to eight switches.

QLogic Virtual Fabric Extension Module

The QLogic Virtual Fabric Extension Module is another example of how IBM has been at the forefront of offering new technology to clients. 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 convergence inside the chassis.

More on the Web

- QLogic Virtual Fabric Extension Module Redbook info
- QLogic Virtual Fabric Extension Module info on PartnerWorld

Clients using the IBM Virtual Fabric 10 Gb 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. The QLogic Virtual Fabric Extension Module offers six ports of 8 Gb Fibre Channel connectivity, without the need for separate Fibre Channel expansion cards in the BladeCenter servers.

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 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.

More on the Web

- Emulex 10 GbE Virtual Fabric Adapter II Redbook info
- Emulex 10 GbE Virtual Fabric Adapter II info on PartnerWorld

The Emulex 10 GbE Virtual Fabric Adapter II supports the IBM 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 II/Advanced II for HS23

The Emulex 10 GbE Virtual Fabric Adapter II (VFA II) and Emulex 10 GbE VFA Advanced II for IBM BladeCenter HS23 are the new options available to the existing IBM BladeCenter Virtual Fabric portfolio. These adapters are supported on the new HS23 blade to enable up to four uplink/downlink ports for increased I/O bandwidth and maximum performance. The combination of HS23 and Emulex options enables clients to simplify their I/O infrastructure by reducing the number of switches needed inside the chassis while supporting Ethernet and virtual NICs (vNICs) using the same hardware components.

More on the Web

- Emulex 10 GbE Virtual Fabric Adapter II for HS23 Redbook info
- Emulex 10 GbE Virtual Fabric Adapter II for HS23 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. Both physical 10 Gbps ports on the adapter can be divided into four virtual ports with bandwidth allocation in 100 Mbps increments up to the maximum of 10 Gbps per physical port. The Emulex 10 GbE VFA Advanced II adds FCoE and iSCSI hardware initiator functionality to enable data center infrastructure convergence.

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. 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 Advanced adds iSCSI hardware initiator functionality.

More on the Web

- Emulex 10 GbE Virtual Fabric Adapter Redbook info
- Emulex 10 GbE Virtual Fabric Adapter info on PartnerWorld

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

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)

investment protection, maximum bandwidth and performance, and simplicity in a converged environment. The Brocade Converged 10 GbE Switch Module 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.

With the base model Converged 10 GbE Switch Module, you can enable 16 of the 30 ports on the switch (eight 10 Gb CEE external ports, eight 8 Gb FC external ports, and 14x 10 Gb CEE internal ports). If you purchase the Port Upgrade Key, you can enable all 30 ports on the Switch Module for a fully realized Converged Ethernet solution.

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

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

The Broadcom 2-port 10 Gb Virtual Fabric Adapter can be configured to operate in virtual NIC mode, where up to eight virtual NIC devices can be enabled. 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.

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

IBM is committed to offering both function and flexibility to our clients through our products. IBM BladeCenter was the first to offer end-to-end 10 Gb Ethernet in a blade server configuration, and these expansion cards are part of that offering. IBM offers two new versions of the card, 2-port and 4-port, both based on the new Broadcom 57711 controller. The existing cards, based on the proven Broadcom 57710 module, will continue to be available to support customers who want to maintain a consistent hardware configuration.

More on the Web

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

Ethernet Switch Modules

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

More on the Web

- Ethernet I/O info on IBM.com

10 Gb Ethernet Pass-Thru Module

The 10 Gb Ethernet Pass-Thru Module for IBM BladeCenter is ideal for clients looking to enable end-to-end non-blocking 10 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

The 14 10 Gb Uplink ports are based on optical SFP+ technology to offer the highest performance while maintaining industry standard connectivity. This offering will also work with BladeCenter Open Fabric Manager, providing all the benefits of I/O Virtualization at 10 Gb speeds.

IBM iFlow Director

Reduce complexity and costs associated with appliance sprawl by consolidating on an IBM BladeCenter platform with a high-performance, low-latency statistical load balancer integrated into a 10 Gigabit Ethernet (GbE) blade switch: IBM iFlow Director. The IBM iFlow Director is designed to deliver high availability, scalability, and lower cost of ownership for wireless gateways, security gateways, traffic management, service differentiation, lawful interception, and network surveillance solutions.

More on the Web

- iFlow Director info on IBM.com
- iFlow Director info on PartnerWorld

Networks are changing. Voice, video, storage, and data are quickly converging onto a single backbone. Growth in cloud services and Web 2.0 multimedia content is pushing bandwidth demand to the network edge. The convergence of fixed and mobile networks to a common next-generation network Interface Protocol (IP) infrastructure is driving exponential growth in network traffic. Threats

due to malicious attacks are increasing, and both businesses and consumers are demanding that their service providers incorporate more defenses into the network. As a result, there is a growing demand for network appliance vendors who provide traffic inspection, bandwidth optimization, security, and lawful interception services to offer gateway solutions at high-speed traffic choke points.

Here are some quick IBM iFlow Director facts:

- High performance, low latency stateless statistical load distribution system for IBM BladeCenter H and HT. Delivers high availability with extensive server health-check mechanisms for rapid failure detection and recovery
- Operates in transparent Layer 2 mode or full Layer 3 mode
- Supports IPv4 and IPv6
- Supports advanced routing and policy-based routing for traffic steering
- Supports flow persistency in order to maintain consistent data flows
- Is extremely cost effective compared to external load balancers
- Is scalable from one to up to 84 servers across multiple BladeCenter chassis.

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

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

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

More on the Web

- IBM BladeCenter Layer 2/3 Copper/Fiber Gigabit Ethernet Switch Module Redbook info
- IBM BladeCenter Layer 2/3 Copper/Fiber Gigabit Ethernet Switch Module info on PartnerWorld

IBM BladeCenter Layer 2-7 Gigabit Ethernet Switch Module

IBM System Networking offers a Layer 2-7 Gigabit Ethernet Switch Module (L2-7 GbE SM) that lets you consolidate full Layer 2-7 LAN switching capabilities within an IBM BladeCenter chassis. Consolidation flattens the topology of the data center infrastructure and reduces the number of discrete devices, management consoles, and manufacturers with which you must work. The L2-7 GbE SM includes advanced security, high availability, and performance features, further reducing the need for discrete function-specific appliances.

The result is dramatic simplification of the data center infrastructure and this translates into faster performance, higher availability, greater scalability, stronger security, simplified management, and lower TCO.

Here are some quick IBM Layer 2-7 facts:

- Improve application availability and boost application performance
- Increase application and server scalability
- Enhance application and server security
- Simplify server deployment and management
- Reduce data center total cost of ownership (TCO).

More on the Web

- IBM BladeCenter Layer 2-7 Gigabit Ethernet Switch Module info on PartnerWorld

Cisco Catalyst Switch Module 3012

The Cisco Catalyst Switch Module 3012 represents the next-generation networking solution for blade server environments. Built on the market-leading Cisco hardware and Cisco IOS Software, the Cisco Catalyst Switch Module 3012 is engineered with unique technologies specifically designed to meet the rigors of blade server-based application infrastructure for the small and medium enterprise.

More on the Web

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

Here are some quick 3012 facts:

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

Cisco Catalyst Switch Modules 3110G and 3110X

The Cisco Catalyst Switch Module 3110G and 3110X are Gigabit Ethernet Switch Modules in a standard switch-bay form-factor for use in all BladeCenter chassis. These stackable switches are full wire-rated, non-blocking switches for use with high performance servers. The 3110G offers four external RJ-45 Gigabit Ethernet connections and the 3110X offers one external 10 Gb Ethernet slot (for use with an X2 transceiver module) for making 10 Gb uplinks to backbone switches or routers.

More on the Web

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

Intelligent Copper Pass-Thru Module

Pass-thru modules are I/O options that can be used for direct connections of blades ports to the external infrastructure devices such as network switches. The Intelligent Copper Pass-thru Module for IBM BladeCenter (ICPM) is similar to a traditional network patch-panel. The Intelligent Copper Pass-thru Module connects the blade servers in the BladeCenter unit to an existing network infrastructure. No configuration of the copper pass-thru module is required. The Intelligent Copper Pass-thru Module provides a single connection from each blade to one RJ-45 connection that can go directly to an external switch or patch panel.

More on the Web

- Copper Pass-Thru info on PartnerWorld

IBM BladeCenter 1/10 Gb Uplink Ethernet Switch Module

To address evolving networks, IBM System Networking offers a leadership product for the IBM BladeCenter portfolio that helps meet the demand of networks in transition like no other switch in the blade market: the IBM BladeCenter 1/10 Gb Uplink Ethernet Switch Module.

The IBM BladeCenter 1/10 Gb Uplink Ethernet Switch Module offers a great price-performance ratio. Its six 1 GbE RJ45 links can be easily deployed in today's networks, while its three 10 GbE SFP+ ports provide an easy migration path to tomorrow's 10 GbE networks. Compared to other vendors' 10 GbE switches, the 1/10

More on the Web

- IBM BladeCenter 1/10 Gb Ethernet Switch info on PartnerWorld
- Ethernet I/O info on IBM.com

Gb switch prepares you for the future and is only half the price of some alternative offerings in the market. Advanced Layer 3 routing protocols like Open Shortest Path First (OSPF) and Border Gateway Protocol (BGP) are included in the switch price. Other blade Ethernet switch vendors require you to pay extra for these features.

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

- Improve application availability and boost application performance
- Future proof your data center with 1/10 Gigabit Ethernet (GbE) connectivity
- Enhance application security with network virtualization
- Simplify server deployment and management.

Server Connectivity Module for IBM BladeCenter

The IBM BladeCenter Server Connectivity Module (SCM) provides a simple Ethernet interface option for connecting the IBM BladeCenter system to the network infrastructure.

More on the Web

- Server Connectivity Module for IBM BladeCenter info on PartnerWorld

Cisco Nexus 4001I Switch Module for IBM BladeCenter

The Cisco Nexus 4001I Switch Module is a blade switch solution for the BladeCenter H and HT chassis providing the server I/O solution

required for high-performance, scale-out, virtualized, and non-virtualized x86 computing architectures. It is a line rate, extremely low-latency, non-blocking, Layer 2, 10 Gigabit Ethernet blade switch that is fully compliant with Fibre Channel over Ethernet (FCoE) and IEEE Data Center Bridging standards.

More on the Web

- Cisco Nexus 4001I info on PartnerWorld
- Cisco Nexus 4001I info on IBM.com
- Cisco Nexus 4001I Redbook

Fibre Channel Switch Modules

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

More on the Web

- Fibre Channel Switch info on IBM.com

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

The Brocade Enterprise 10-port and 20-port 8 Gb SAN Switch Modules for IBM BladeCenter deliver embedded Fibre Channel switching with the industry's fastest Fibre Channel throughput performance (8 Gbps). The 10-port and 20-port switches provide basic FC switch functionality while the Enterprise 20-Port model is a fully enabled switch with a complete set of advanced SAN fabric service licensed features.

More on the Web

- Brocade 10- and 20-port 8 Gbp SAN Switch info on PartnerWorld
- Brocade 10- and 20-port 8 Gbp SAN Switch info on IBM.com
- Brocade 10- and 20-port 8 Gbp SAN Switch Redbook

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
- Cisco 4 Gb 10 and 20-port Fibre Channel Switch Redbook

Cisco 4 Gb 10- and 20-port Fibre Channel

The Cisco Systems 4 Gb 10-port and 20-port Fibre Channel Switch Modules for IBM BladeCenter provide high-performance end-to-end SAN solutions using 4 Gb Fibre Channel technology. These modules allow seamless integration of IBM BladeCenter into existing Cisco SANs, and have functions equivalent to the Cisco MDS 9124 switch. 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.

QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module

The QLogic 8 Gb and 4/8 Gb Intelligent Pass-thru Modules for IBM BladeCenter provide seamless integration of an IBM BladeCenter solution into existing Fibre Channel storage networks using N_Port ID Virtualization (NPIV) technology. Each module concentrates multiple blade servers into the external ports, which in turn connect to external Fibre Channel switches that support NPIV. The pass-thru module presents one or more blade servers per port to the fabric. The module expands the fabric, but unlike a full fabric switch, it does not count against the fabric domain.

More on the Web

- QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module info on PartnerWorld
- QLogic Intelligent 8 Gb Pass-Thru Fibre Channel Module Redbook

QLogic 20-port 8 Gb SAN Switch Module

The QLogic 20-port 8 Gb and 4/8 Gb SAN Switch Modules for IBM BladeCenter are a high-speed addition to the BladeCenter switch portfolio. Each module helps enable scalability in storage area network (SAN) size and complexity while maintaining ease of management. These modules are full-fabric Fibre Channel (FC) switches which enable high performance SAN connectivity of up to 8 Gbps.

More on the Web

- QLogic 20-port 8 Gb SAN Switch Module info on PartnerWorld
- QLogic 20-port 8 Gb SAN Switch Module Redbook

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

Clients want to increase the use of their existing servers to reduce overall cost as well as the IT footprint within the organization. IBM BladeCenter offers several choices, including servers, chassis, and types of interconnect fabric. This solution offers end-to-end 40 Gb (4X QDR) InfiniBand connectivity. Clients can take advantage of the resiliency of BladeCenter as well as the performance of 4X QDR InfiniBand in a single package.

More on the Web

- Voltaire 40 Gb InfiniBand Switch Redbook Technote
- Voltaire 40 Gb InfiniBand Switch info on PartnerWorld

The Voltaire 40 Gb InfiniBand Switch Module for BladeCenter provides InfiniBand QDR connectivity between the server platform's high performance blade servers and external InfiniBand fabrics in non-blocking designs, all on a single device. Voltaire's high speed module also accommodates performance-optimized fabric designs utilizing a single BladeCenter chassis or stacking multiple BladeCenter chassis without requiring an external InfiniBand switch.

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

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

The IBM BladeCenter S SAS RAID Controller Module enables a fully redundant storage area network (SAN) based on the high-performance, fully duplex 3 Gbps technology. With this innovative solution, small offices across the world can benefit from blades, SAN storage, networking, and management, all integrated into a neat BladeCenter S chassis.

Here are some quick SAS RAID Controller Module facts:

- Fully redundant SAN integrated into BladeCenter S chassis
- High-performance, fully duplex, 3 Gbps speeds

More on the Web

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

- Support for RAID 0, 1, 5, 10
- Supports two disk storage modules (DSM) with up to 12 x 3.5 inch SAS or Nearline SAS drives.

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.

More on the Web

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

Here are some quick SAS Connectivity Module facts:

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

7

PureFlex System

To meet today's complex and ever-changing business demands, you need a solid foundation of server, storage, networking, and software resources that is simple to deploy and can quickly and automatically adapt to changing conditions. You also need access to—and the ability to take advantage of—broad expertise and proven best practices in systems management, applications, hardware maintenance, and more.

For a pre-configured, pre-integrated infrastructure, IBM PureFlex System, part of the IBM PureSystems family of expert integrated systems, combines advanced IBM hardware and software along with patterns of expertise and integrates them into three optimized configurations that are simple to acquire and deploy to achieve faster time to value.

More on the Web

- IBM PureSystems Business Partner Guidebook

With IBM Flex System, the next evolution of blade technology is here—delivering extraordinary compute power, storage capability, and networking flexibility with the latest processors and a no-compromise design! IBM Flex System, the elements that make up IBM PureFlex System, allows you to build your own system to meet your unique IT requirements

with a set of no-compromise components including compute, storage, networking, and systems management.

Learn more about IBM PureFlex System and IBM Flex System in the IBM PureSystems Business Partner Guidebook.

8

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

More on the Web

- Overview of all IBM System Networking on IBM.com

The smarter data center with improved economics of IT can be achieved by connecting servers and storage with a high-speed and intelligent network fabric that is smarter, faster, greener, open and easy to manage.

IBM takes an open, standards-based approach to implement the latest advances in today's flat, converged data center network designs. IBM System Networking solutions enable clients to deploy a high-speed, low-latency Unified Fabric Architecture.

Advanced virtualization awareness reduces the cost and complexity of deploying physical and virtual data center infrastructure. Simplify management IBM data center networks are easy to deploy, maintain, scale and virtualize, delivering the foundation of consolidated operations for dynamic infrastructure management.

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 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 consolidation, 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, today, that 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:

- 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 Portfolio

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,

which includes advanced networking software and high performance switching hardware.

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 specifications
- 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 Distributed Virtual Switch 5000V

The IBM System Networking Distributed Virtual Switch 5000V is an advanced, feature-rich distributed virtual switch for VMware environments with policy-based virtual machine (VM) connectivity. The IBM Distributed Virtual Switch (DVS) 5000V enables network administrators familiar with IBM System Networking switches to manage the IBM DVS 5000V just like IBM physical switches using advanced networking, troubleshooting, and

More on the Web

- IBM DVS 5000V info on PartnerWorld
- IBM DVS 5000V info on IBM.com

management features so the virtual switch is no longer hidden and difficult to manage.

Support for Edge Virtual Bridging (EVB) based on the IEEE 802.1Qbg standard enables scalable, flexible management of networking configuration and policy requirements per VM, and eliminates many of the networking challenges introduced with server virtualization. The IBM DVS 5000V works with VMware vSphere 5.0 and beyond and interoperates with any 802.1Qbg-compliant physical switch to enable switching of local VM traffic in the hypervisor or in the upstream physical switch. This provides a competitive advantage for IBM with Vmware.

IBM Software Defined Network for Virtual Environments

IBM SDN for Virtual Environments (SDN VE) uses IBM's Distributed Overlay Virtual Ethernet (DOVE) technology to virtualize the networks you already have. IBM Software Defined Network for Virtual Environments creates a virtual network for virtual machines that is decoupled and isolated from the physical network, much like a virtual machine is decoupled and isolated from its host server hardware. This approach provides several advantages:

More on the Web

- IBM SDN VE specifications
- IBM SDN VE info on PartnerWorld
- IBM SDN VE info on IBM.com

- Virtual networks can be created without any changes to the existing network.
- Since the physical network does not have to be changed, it can be wired once.
- Provisioning and administration can be simplified and automated.
- IP and MAC addresses can be reused permitting logical separation of networks for secure multi-tenancy or data center consolidation.

IBM Programmable Network Controller

The IBM Programmable Network Controller (IBM PNC) provides an OpenFlow-based network fabric with centralized control of network flows and unlimited virtual machine (VM) mobility—implemented in enterprise-class software. The controller is our first Software Defined Networking (SDN) offering, which is an emerging standard for building fast and intelligent networks.

More on the Web

- IBM PNC specifications
- IBM PNC info on PartnerWorld
- IBM PNC info on IBM.com

With the Programmable Network Controller, data flow control is abstracted from static individual switches to dynamic programmable network-level control. Administrators can quickly create and control virtual networks for each application environment or network service. They can scale highly virtualized application infrastructures, multi-tenant networks on public or private clouds.

By implementing the network fabric's packet forwarding control logic in a software-defined controller, the IBM PNC centralizes the logic that is traditionally embedded in the control plane function of Ethernet switches and routers. Unlike conventional switches that are statically configured once and then must be configured whenever application workloads change or traffic patterns fluctuate, administrators can use the IBM PNC to dynamically direct traffic across multiple switches throughout one or more 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 in-

More on the Web

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

novations. IBM's top of rack products are lossless, low latency, and low power.

IBM RackSwitch G8000

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

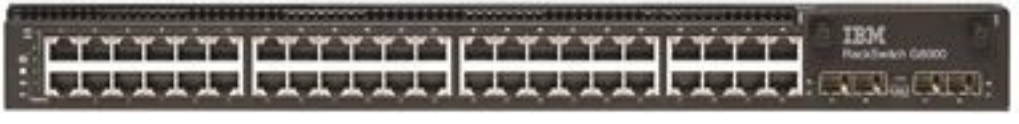
The G8000 is virtualized—for the first time providing rack-level virtualization of networking interfaces for a rack full of server and storage systems—decoupling the scaling of networking and computing capacity via on-switch VMready software. VMready enables the movement of virtual machines—providing matching movement of VLAN assignments,

ACLs, and other networking and security settings. VMready works with all leading VM providers.

The G8000 is cooler—implementing a choice of directional cooling options to maximize data center layout and provisioning. Its superior airflow design complements the hot-aisle and cold-aisle data center cooling model.

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



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

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

- Low 120 W power draw and variable speed fans help reduce power consumption. DC power model is also available.
- Network virtualization—IBM VMready automatically detects virtual machine movement from one physical server to another.

IBM RackSwitch G8052

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

The RackSwitch G8052 is virtualized—supporting IBM VMready technology, an innovative, standards-based solution to manage virtual machines (VMs) in small to large-scale data center and cloud environments. VMready works with all leading VM providers.

The RackSwitch G8052 is cool—implementing a choice of directional cooling to maximize data center layout and provisioning. Its superior airflow design complements the hot-aisle and cold-aisle data center cooling model.

The RackSwitch G8052 is easy—with server-oriented provisioning via point-and-click management interfaces, along with the optional System Networking Switch Center software package for updating large groups of switches.

- G8052 specifications
- G8052 info on PartnerWorld
- G8052 info on IBM.com

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

Here are some quick G8052 facts:

- 48 × 1 GbE RJ45 ports and 4 standard 10 GbE SFP+ ports
- Choice of airflow direction, allowing for significant savings in cooling costs
- Low 130 W power rating and variable speed fans help reduce power consumption
- Network virtualization—VMready automatically detects virtual machine movement from one physical server to another.

IBM RackSwitch G8124E

The IBM RackSwitch G8124E (Figure B.3) is a 10 Gigabit Ethernet switch specifically designed for the data center, providing a virtualized, cooler and easier network solution. The G8124E offers twenty-four 10 Gigabit Ethernet ports in a high-density, 1U footprint. Designed with top performance in mind, the RackSwitch G8124E provides line-rate, high-bandwidth switching, filtering and traffic queuing without delaying data and large data-center grade buffers to keep traffic moving.

The G8124E is virtualized—providing rack-level virtualization of networking interfaces. VMready software enables movement of virtual machines—providing matching movement of VLAN assign-

- G8124E specifications
- G8124E info on PartnerWorld
- G8124E info on IBM.com

Figure B.3. IBM RackSwitch G8124E (and links to more detail).

ments, ACLs and other networking and security settings. VMready works with all leading VM providers, such as VMware, KVM, Citrix, Xen, IBM PowerVM and Microsoft Hyper-V. The G8124E also supports Virtual Fabric, which allows for the carving up of a physical NIC into 2–8 virtual NICs (vNICs) and creates a virtual pipe between the adapter and the switch (using the IBM Networking OS) for improved performance, availability and security, while reducing cost and complexity.

Here are some quick G8124E Facts:

- Twenty-four 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 nonblocking 10 Gigabit Ethernet with deterministic latency of 570 nanoseconds
- IBM VMready helps reduce configuration complexity and improves security levels in virtualized environments
- Virtual Fabric capability allows for the carving up of a physical NIC into multiple virtual NICs.

IBM RackSwitch G8264

The IBM RackSwitch G8264 (Figure B.4) is ideal for today's big data, cloud, and optimized workloads. It is an enterprise-class and full-featured data-center switch that delivers line-rate, high-bandwidth switching, filtering, and traffic queuing without delaying data. Large data-center grade buffers keep traffic moving. Redundant power and fans along with numerous high availability features equips the switch for business-sensitive traffic. The G8264 supports IBM VMready technology, an innovative, standards-based solution to manage virtual machines (VMs) in small to large-scale data center and cloud environments.

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

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

The RackSwitch G8264 is ideal for latency-sensitive applications such as high performance computing clusters and financial applications and is a key piece when connecting multiple chassis together with Pure System Solutions. The G8264 supports stacking for up to eight switches for simplified switch management as well as IBM Virtual Fabric to enable clients to diminish the number of I/O adapters buy creating virtual NIC's out of a 10 Gb adapter, helping reduce cost and complexity. The G8264 supports the newest protocols—including Data Center Bridging/Converged Enhanced Ethernet (DCB/CEE) for support of Fibre Channel over Ethernet (FCoE), in addition to iSCSI and NAS.

Here are some quick G8264 facts:

- Optimized for applications requiring high bandwidth and low latency
- Supports Virtual Fabric and OpenFlow
- Up to sixty-four 10 Gb SFP+ ports in a 1U form factor
- Future-proofed with four 40 Gb QSFP+ ports
- Stacking—A single switch image and configuration file can be used for up to eight switches, sharing only one IP address and one management interface.

IBM RackSwitch G8264T

The RackSwitch G8264T (Figure B.5) is ideal for clients looking to expand into 10 Gb environments without compromising their data center's overall TCO. It provides flexible connectivity for high-speed server and storage devices across distances up to 100m at a low cost.

The G8264T is an enterprise-class and full-featured data-center switch that delivers line-rate, high-bandwidth switching, filtering, and traffic queuing without delaying data. Large data-center grade buffers keep traffic moving. Redundant power and fans along with numerous high availability features equips the switch for business-sensitive traffic. The G8264T supports IBM VMready technology, an innovative, standards-based solution to manage virtual machines (VMs) in small to large-scale data center and cloud environments.

Here are some quick G8264T facts:

- Forty-eight 10GBase-T/1000Base-T RJ45 connections plus four 40 Gb QSFP+ connections in a 1U form factor
- Flexible and low-cost connectivity option for 10 Gb environments supporting distances up to 100 meters
- Supports OpenFlow and IBM VMready.

- G8264T specifications
- G8264T info on PartnerWorld
- G8264T info on IBM.com

Figure B.5. IBM RackSwitch G8264T (and links to more detail).

IBM RackSwitch G8264CS

The G8264CS (Figure B.6) offers the benefits of a converged infrastructure today, while providing flexibility for future growth and expansion. This switch is ideal for clients looking to connect via their existing SAN infrastructure, as well as clients wanting native Fibre Channel connectivity, in addition to support for protocols like Ethernet, FCoE, and iSCSI.

The G8264CS simplifies deployment with its innovative IBM Omni Port technology. Omni Ports give clients the flexibility to choose 10 Gb Ethernet, 4/8 Gb Fibre Channel or both for upstream connections and in FC mode, Omni Ports provide convenient access to FC storage. G8264CS's Omni Port technology helps consolidate enterprise storage, networking, data, and management onto a simple to manage single fabric and reduces costs associated with energy and cooling, management and maintenance, and capital costs.

Here are some quick GS8264CS facts:

- Lossless Ethernet, Fibre Channel, and Fibre Channel over Ethernet (FCoE) in one switch
- Extreme flexibility with IBM Omni Ports that support 10 Gb Ethernet and/or 4/8 Gb Fibre Channel connections

- GS264CS specifications
- G8264CS info on PartnerWorld
- G8264CS info on IBM.com

Figure B.6. IBM RackSwitch G8264CS (and links to more detail).

- Ideal for clients looking to aggregate FC/FCoE converged traffic with ability to connect to existing SANs
- Proven IBM end-to-end convergence testing delivering easy interoperability throughout network.

IBM RackSwitch G8316

The IBM System Networking RackSwitch G8316 (Figure B.7) 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, with 1.28 Tbps—in a 1U footprint. 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 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 specifications
- G8316 info on PartnerWorld
- G8316 info on IBM.com

Figure B.7. 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 sixty-four 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.

IBM Flex System Fabric

IBM can help you reduce cost, complexity and risk with IBM Flex System Fabric—a portfolio of high performance networking products that can help simplify connectivity of your LAN and SAN infrastructure. The portfolio includes support for Ethernet, Fibre Channel over Ethernet (FCoE) and even Fibre Channel protocols. Flex System Fabric also supports extraordinary convergence of NAS, iSCSI and even FCoE where the Fibre Channel can be broken out directly in the chassis or upstream in the network. The portfolio offers easy standards-based interoperability with your existing networking environment, including Cisco, Brocade, Juniper and other networking infrastructures.

More on the Web

- Flex System Fabric

SI4093 System Interconnect Module

The IBM Flex System Fabric SI4093 System Interconnect Module (Figure F.1) enables a simplified integration of the IBM Flex System into your existing networking infrastructure. The default configuration of the SI4093 requires no management for most data center environments, eliminating the need to configure each device or individual ports thus reducing the number of management points.

The device provides a low latency, loop-free interface that does not rely upon spanning tree protocols, thereby removing one of the greatest deployment and management complexities of a traditional switch. The SI4093 offers administrators a simplified deployment experience while maintaining the performance of intra-chassis connectivity, yet provides the simplicity of a single aggregated connection to the upstream network.

Here are some quick SI4093 facts:

- Preconfigured device designed for easy network connectivity to reduce deployment time
- Reduces management complexity without compromising performance
- Investment protection with "pay-as-you-grow" scalability with the ability to turn on additional 10 Gb or 40 Gb ports

- SI4093 System Interconnect Module details on PartnerWorld
- SI4093 System Interconnect Module info on IBM.com
- SI4093 Scalable Switch competitive info on COMP

Figure F.1. IBM Flex System Fabric SI4093 System Interconnect Module (and links to more detail).

- Easy interoperability with multi-vendor network infrastructures
- Reduce networking CAPEX by up to 60 percent when compared with a pass-thru module.

EN4093R 10 Gb Scalable Switch

The IBM Flex System Fabric EN4093R 10 Gb Scalable Switch (Figure F.2) provides unmatched scalability and performance, while also delivering innovations to help address a number of networking concerns today and providing capabilities that will help you prepare for the future.

With the growth of virtualization and the evolution of cloud, many of today's applications require low latency and high bandwidth performance. The Flex System Fabric EN4093R is the first blade switch to support sub microsecond latency and up to 1.28 Tbps, while also delivering full line rate performance, making it

- EN4093R 10 Gb Scalable Switch details on PartnerWorld
- EN4093R 10 Gb Scalable Switch info on IBM.com
- EN4093R 10 Gb Scalable Switch competitive info on COMP

Figure F.2. IBM Flex System Fabric EN4093R 10 Gb Scalable Switch (and links to more detail).

ideal for managing dynamic workloads across your network. In addition, the switch provides a rich Layer 2 and Layer 3 feature set that is ideal for many of today's data centers, plus offers industry-leading uplink bandwidth by being the first blade switch to support 40 Gb uplinks.

Here are some quick EN4093R 10 Gb Scalable Switch facts:

- "Pay as you grow" scalability with the ability to turn on additional 10 Gb or 40 Gb ports
- Reduce cost and complexity via network convergence, stacking, and Virtual Fabric
- Performance and low latency with 1.28 Tbps and less than 1 microsecond latency
- Investment protection when migrating from 1 Gb to 10 Gb and to a converged network
- Designed for FCoE as a transit switch, where FC is broken out further upstream in the network.

EN2092 1 Gb Ethernet Scalable Switch

The IBM Flex System EN2092 1 Gb Ethernet Scalable switch (Figure F.3) provides outstanding flexibility allowing you to buy one switch today and enhance its functionality in the future. The scalable architecture allows you to support 2-port or 4-port 1 Gb adapters with this switch. The EN2092 supports up to 28 server ports and up to twenty 1 Gb uplinks and four 10 Gb uplinks. Designed with top performance in mind, the EN2092 provides high availability with legendary IBM quality and switch failover capability.

This switch is an exceptionally flexible integrated switch with extreme scalability and performance, while also delivering best-in-class networking innovations to help you address today's networking requirements. It also provides advanced capabilities to address future needs.

- 1 Gb Scalable Switch details on PartnerWorld
- 1 Gb Scalable Switch details on IBM.com
- 1 Gb Scalable Switch competitive info on COMP

Figure F.3. IBM Flex System EN2092 1 Gb Ethernet Scalable Switch (and links to more detail).

Here are some quick 1 Gb Scalable Switch facts:

- "Pay as you grow" scalability with the ability to turn on additional 1 Gb ports or 10 Gb capacity
- Simpler management with IBM's innovative VMready virtualization-aware networking for automated Virtual Machine mobility
- Investment protection for your 1 Gb or 10 Gb network infrastructure
- Integrated network management allowing network administrators to manage servers, storage, and networks together as one logical unit.

SAN Fabric

More on the Web

- SAN Fabric info on IBM.com

The growing importance of storage is fueling a model for storage infrastructures in which storage devices are not attached to a specific server but rather make up an independent storage area network, or SAN. The storage devices (disk arrays, tape drives, SVC, etc.) residing in a SAN are shared among a group of servers that reside on the same network.

In addition to storage devices and servers, IBM sells switches, directors, and routers used to build SAN fabrics. In this section, we look at these SAN fabric products. IBM SAN products and solutions provide integrated SMB and enterprise SAN solutions with multiple local, campus, metropolitan, and global storage networking options.

SAN Fabric for Entry-Level Workloads

Here is a list of SAN fabric products designed for entry-level workloads. Click on the links and you will jump to the section of this ebook that describes the product.

SAN24B-5

SAN24B-4 Express

Cisco MDS 9124 Express

Cisco 9148

More on the Web

- SAN Fabric for entry-level workloads

SAN Fabric for Mid-Size Workloads

Here is a list of SAN fabric products designed for mid-size workloads. Click on the links and you will jump to the section of this ebook that describes the product.

SAN48B-5

SAN80B-4

SAN96B-5

Cisco MDS 9148

More on the Web

- SAN Fabric for mid-size workloads

SAN Fabric for Enterprise Workloads

Here is a list of SAN fabric products designed for large enterprise workloads. Click on the links and you will jump to the section of this ebook that describes the product.

More on the Web

- SAN Fabric for enterprise workloads

SAN384B-2 and SAN768B-2

Cisco MDS 9500 series Multilayer Directors

Cisco MDS 9710 Multilayer Director

SAN Specialty Switches

We also offer the following SAN Specialty Switches. These SAN specialty switches deliver capabilities ranging from connecting heterogeneous SAN fabrics, to enabling distance extension using Fibre Channel over IP, to converging SAN and Ethernet traffic on a single platform. Click on the links and you will jump to the section of this ebook that describes the product.

More on the Web

- SAN specialty switches

SAN06B-R

SAN32B-E4

Brocade VDX 6730 Converged Switch for IBM

Cisco MDS 9222i

SAN b-type Switches

The IBM System Storage SAN b-type family provides entry, mid-range and specialty switches and enterprise directors.

SAN24B-4 Express

The IBM System Storage SAN24B-4 Express fabric switch (Figure S.1) is designed specifically to address the needs of small- to medium-sized storage area network (SAN) environments. It can be used to create a wide range of high-performance SAN solutions, from simple, single-switch configurations to larger, multi-switch configurations that support fabric connectivity and advanced business continuity capabilities. Infrastructure simplification solutions for IBM System x, IBM BladeCenter and IBM Power Systems servers include storage consolidation and high availability server

- SAN24B-4 specifications
- SAN24B-4 Express info on PartnerWorld
- SAN24B-4 Express info on IBM.com

Figure S.1. IBM System Storage SAN24B-4 Express (with links to detail).

clustering with System Storage disk storage arrays. Business continuity solutions include data protection with System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software.

Here are some quick SAN24B-4 Express facts:

- Benefit from easy-to-install and easy-to-use features designed specifically for small- to medium-sized environments
- Reach new performance levels with 8 Gbps Fibre Channel technology
- Scale from 8 to 16 to 24 ports with Ports on Demand
- Protect existing 4, 2 and 1 Gbps infrastructure investments while positioning for future technologies
- Use as the foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft Windows, UNIX, Linux, and IBM AIX and OS/400 operating systems.

SAN24B-5

The IBM System Networking SAN24B-5 switch (Figure S.2) is designed to provide outstanding price and performance value, combining flexibility, simplicity, 16 Gbps Fibre Channel technol-

- SAN24B-5 specifications
- SAN24B-5 Express info on PartnerWorld
- SAN24B-5 Express info on IBM.com

Figure S.2. IBM System Storage SAN24B-5 Express (with links to detail).

ogy and enterprise-class functionality in an entry-level switch. The SAN24B-5 is configurable in 12 or 24 ports and supports 2, 4, 8 or 16 Gbps speeds in an efficiently designed 1U form factor. Base unit includes one (249824G/2498-X24) or two (2498-F24) integrated power supplies and fans. A second power supply provides additional redundancy for increased resiliency.

Here are some quick SAN24B-5 facts:

- Gain flexibility, simplicity and enterprise-class functionality in a 24-port, 1U form factor, entry-level switch
- Scale from 12 to 24 ports using ports-on-demand capabilities
- Maximize resiliency with non-disruptive software upgrades and redundant power supply
- Streamline deployment and troubleshooting time with dynamic fabric provisioning, critical monitoring and advanced diagnostic features
- Simplify server connectivity and SAN scalability with dual functionality as either a full-fabric SAN switch or an N_Port ID virtualization (NPIV)-enabled access gateway.

SAN48B-5

The IBM System Storage SAN48B-5 SAN switch (Figure S.3) works (SANs) is designed to meet the demands of hyper-scale private or hybrid cloud storage environments by delivering 16 Gbps Fibre Channel technology and capabilities that support highly virtualized environments. To enable greater flexibility and investment protection, SAN48B-5 is configurable in 24, 36 or 48 ports and supports 2, 4, 8, 10 or 16 Gbps speeds in an efficiently designed 1U package. This switch—now enhanced with enterprise connectivity options that add support for IBM FICON connectivity—can provide a highly reliable infrastructure when used with fast, scalable IBM System z servers.

Here are some quick SAN48B-5 facts:

- Gain great flexibility for diverse deployment strategies with the Gen 5 Fibre Channel switch, which delivers 16 Gbps performance with up to 48 ports in an energy-efficient, 1U form factor
- Leverage Ports on Demand (PoD) capabilities to achieve fast, easy, and cost-effective scaling from 24 to 48 ports in 12-port increments
- Maximize availability with nondisruptive software upgrades and redundant, hot-pluggable components.

- SAN48B-5 specifications
- SAN48B-5 info on PartnerWorld
- SAN48B-5 info on IBM.com

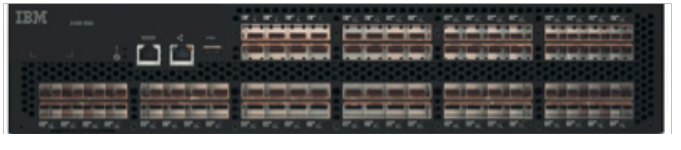
Figure S.3. IBM System Storage SAN48B-5 16 Gbps SAN fabric switch (and links to more detail).

SAN80B-4

The IBM System Storage SAN80B-4 SAN fabric switch (Figure S.4) provides 48, 64, or 80 active ports and is designed for high performance with 8 Gbps link speeds and backward compatibility to support links running at 4, 2, and 1 Gbps link speeds. High availability features make it suitable for use as a core switch in midrange environments or as an edge switch in enterprise environments where a wide range of SAN infrastructure simplification and business continuity configurations are possible. IBM POWER Systems, System x, System z, and many non-IBM disk and tape devices are supported in many common operating system environments. Optional features provide specialized distance extension, dynamic routing between separate or heterogeneous fabrics, link trunking, FICON, Server Application Optimization (SAO), performance monitoring, and advanced security capabilities.

Here are some quick SAN80B-4 facts:

- High port density design with up to 80 ports in an efficient, compact 2U height helps save rack space
- Robust midrange and enterprise SAN fabric switch for IBM POWER Systems, System x, System z, and other server environments



- SAN80B-4 specifications
- SAN80B-4 info on PartnerWorld
- SAN80B-4 info on IBM.com

Figure S.4. IBM System Storage SAN80B-4 SAN fabric switch (with links to detail).

- Provides new levels of performance with 8 Gbps Fibre Channel (FC) technology
- Ports-on-Demand scalability supports non-disruptive capacity activation from 48 to 64 to 80 ports
- Designed to support high availability with redundant, hot-swappable fans and power supplies and non-disruptive software upgrades

SAN96B-5

The IBM System Networking SAN96B-5 switch (Figure S.5) is a high-density, purpose-built, foundational building block for large and growing storage area network (SAN) infrastructures. It is designed to provide highly resilient, scalable and simplified network infrastructure for storage. By delivering market-leading, Gen 5 Fibre Channel technology and capabilities with 16 Gbps performance, SAN96B-5 meets the demands of growing, dynamic workloads; evolving, virtualized data-centers; and highly virtualized, private and hybrid cloud storage environments.

SAN96B-5 provides industry-leading scalability, reliability and performance in a flexible, easy-to-deploy enterprise-class switch

- SAN96B-5 specifications
- SAN96B-5 info on PartnerWorld
- SAN96B-5 info on IBM.com

Figure S.5. IBM System Storage SAN96B-5 SAN fabric switch (and links to detail).

that enables greater data center consolidation, operational efficiency and business continuity. In addition to increased throughput, it helps improve bandwidth utilization, security, and network visibility and management through in-flight data compression, encryption and advanced diagnostics. This is an ideal switch for bandwidth-intensive workloads that require a large number of ports.

Here are some quick SAN96B-5 facts:

- Support highly virtualized private and hybrid cloud storage environments and data center consolidation with high scalability in an ultra-dense, Gen 5 Fibre Channel 96-port switch
- Enable "pay-as-you-grow" flexibility—from 48 to 96 ports—using the Ports on Demand (PoD) feature with speeds up to 16 Gbps
- Provide data center-to-data center security and bandwidth savings with up to eight in-flight encryption and compression ports
- Help maximize application uptime and performance while reducing overall operational expenses with ClearLink diagnostic technology (D_Ports).

b-type Specialty Switches

In this section, we will explore b-type specialty switches.

SAN06B-R

The IBM System Storage SAN06B-R extension switch (Figure S.6) accelerates and optimizes replication, backup, and migration over any distance using next-generation Fibre Channel and Fibre Channel over IP (FCIP) networking technology. It combines industry leading performance and reliability, "pay-as-you-grow" scalability, and flexible deployment options to address the most demanding disaster recovery, compliance, and data mobility requirements.

A wide range of IBM System Storage mid-range and enterprise storage area network (SAN) infrastructure simplification and business continuity solutions can be created with the IBM System

Storage SAN06B-R extension switch. Infrastructure simplification solutions for the IBM Power Systems and System x families include disaster tolerance over metropolitan and global IP networks with IBM System Storage disk arrays, tape libraries, and IBM Tivoli Storage Manager data protection software. Support for System z servers is provided via the optional 8 Gbps Advanced Extension, IBM FICON Accelerator and FICON CUP Activation features.

Here are some quick SAN06B-R facts:

- Designed for high performance to maximize replication with up to sixteen 8 Gbps Fibre Channel (FC) ports and six 1 Gigabit Ethernet (GbE) ports for faster data replication, backup and recovery.
- Utilizes existing IP-based Metropolitan Area Network (MAN) or Wide Area Network (WAN) infrastructures for cost-effective replication, backup, and recovery
- "Pay-as-you-grow" scalability
- FCIP trunking enables logical high-bandwidth FCIP tunnels spanning multiple physical ports to maximize bandwidth and WAN link resiliency.

- SAN06B-R specifications
- SAN06B-R info on PartnerWorld
- SAN06B-R info on IBM.com

Figure S.6. IBM System Storage SAN06B-R Extension Switch (with links to detail).

- Enhanced Compression Architecture provides multiple modes to optimize compression ratios for various throughput requirements.
- Adaptive Rate Limiting dynamically adjusts bandwidth between minimum and maximum rate limits to optimize bandwidth utilization and sharing.
- FCIP Quality of Service (QoS) is available on all b-type platforms that support 8 Gbps link speeds, provides high-,medium- and low-priority handling of initiator-target flows within the same FCIP tunnel for transmission over the WAN.
- FICON Accelerator uses advanced networking technologies, data management techniques and protocol intelligence to accelerate FICON Global Mirror, formerly XRC and tape read/write operations over distances well beyond 300 Km.
- Storage-optimized TCP optimizes TCP window size and flow control, accelerating TCP transport for storage applications.
- Integrated IBM System Storage SAN b-type switch management helps simplify installation and administration and helps provide fabric investment protection.
- Integration with IBM System Storage Data Center Fabric Manager (DCFM) simplifies configuration.

SAN32B-E4

The IBM System Storage SAN32B-E4 Encryption Switch (Figure S.7) is a high-performance stand-alone device designed for protecting data-at-rest in mission-critical environments. In addition to helping IT organizations achieve compliance with regulatory mandates and meeting industry standards for data confidentiality, the SAN32B-E4 Encryption Switch also protects them against potential litigation and liability following a reported breach.

Data is one of the most highly valued resources in a competitive business environment. Protecting that data, controlling access

- SAN32B-E4 specifications
- SAN32B-E4 info on PartnerWorld
- SAN32B-E4 info on IBM.com

Figure S.7. IBM System Storage SAN32B-E4 Encryption Switch (and links to more detail).

to it, and verifying its authenticity while maintaining its availability are priorities in our security-conscious world. Increasing regulatory requirements are also helping to drive the need for the adequate security of data. Encryption is a powerful and widely used technology that helps protect data from loss and inadvertent or deliberate compromise.

In the context of data center fabric security, IBM provides advanced encryption services for storage area networks (SANs) with the IBM System Storage SAN32B-E4 Encryption Switch. The switch is a high-speed, highly reliable hardware device that delivers fabric-based encryption services to protect data assets either selectively or on a comprehensive basis. The 8 Gbps SAN32B-E4 Fibre Channel Encryption Switch scales non-disruptively, providing from 48 up to 96 Gbps of encryption processing power to meet the needs of the most demanding environments with flexible, on-demand performance. It also provides compression services at speeds of up to 48 Gbps for tape storage systems. Moreover, it is tightly integrated with one of the industry-leading, enterprise-class key management systems, the IBM Tivoli Key Lifecycle Manager (TKLM), which can scale to support key life-cycle services across distributed environments.

Here are some quick SAN32B-E4 facts:

- Enforce data confidentiality and privacy requirements using high-performance, scalable fabric-based encryption
- Centralize administration of data-at-rest encryption services to ensure data protection on both disk and tape
- Reduce operational costs and simplify management through the IBM Tivoli Key Lifecycle Manager solution
- Meet regulatory mandates for securing data while maintaining application performance with on-demand encryption and compression processing power
- Industry-standard AES-256 encryption algorithms for both disk and tape in a centralized security platform for SAN environments
- High-performance encryption processing at up to 96 Gbps to support heterogeneous enterprise data centers
- Plug-in encryption services available to all host servers, including virtual machines, attached to data center fabrics
- Frame redirection technology to enable easy, non-intrusive deployment of fabric-based security services.

Brocade VDX 6730 Converged Switch

Seeking better ways to build clouds and virtualized data centers, today's IT organizations are turning to high performance networking solutions that increase flexibility through leading-edge technologies. Whether organizations want to enhance their classic hierarchical network architectures or deploy flatter scale-out fabrics for virtualized data centers, the Brocade VDX 6730 Converged Switches for IBM (Figure S.8) deliver the innovative technology to enhance and simplify their networks.

IBM is partnering with Brocade, an industry-leading SAN Switch provider, to deliver converged data center solutions. Converging FC storage and regular Ethernet traffic on one platform allows admin-

- BROCADE VDX 6730 specifications
- BROCADE VDX 6730 info on PartnerWorld
- BROCADE VDX 6730 info on IBM.com

Figure S.8. Brocade VDX 6730 Converged Switch for IBM SAN specialty switch (with links to detail).

istrators to reduce the number of adapters, simplify management and protect storage investments by utilizing the existing SAN infrastructure. IBM delivers interoperability by providing end-to-end FCoE testing with the latest System x servers, Brocade VDX 6730 Converged switches, IBM System Storage SAN b-type and Brocade SAN switches and IBM Storage.

Here are some quick BROCADE VDX 6730 facts:

- 1U Brocade VDX 6730-32 with 24 x 10 GbE LAN ports and 8 x 8 Gbps native FC ports (FC transceivers shipped standard)
- 2U Brocade VDX 6730-76 with 60 10 GbE LAN ports and 16x 8 Gbps native FC ports (FC transceivers shipped standard)
- 10 Gigabit Ethernet (GbE) FCoE switch with LAN and native Fibre Channel ports
- Supports multiple protocols including Fibre Channel over Ethernet (FCoE), iSCSI and NAS
- Streamlines management by utilizing Brocade Network Advisor and available integration with IBM System Director
- Ideal for customers looking to connect to existing Brocade SANs.

SAN b-type Directors

In this section, we will explore SAN b-type directors.

SAN384B-2 and SAN768B-2

The IBM System Storage SAN768B-2 and SAN384B-2 fabric backbones (Figure S.9) are among the industry's most powerful Fibre Channel switching infrastructure offerings. They provide reliable, scalable, high performance foundations for mission-critical storage. These fabric backbones also deliver enterprise connectivity options to add support for IBM FICON connectivity, offering a high-performing and reliable FICON infrastructure with fast and scalable IBM System z servers.

Designed to increase business agility while providing nonstop access to information and reducing infrastructure and administrative costs, SAN768B-2 and SAN384B-2 Gen 5 Fibre Channel fabric backbones deliver a new level of scalability and advanced capabilities to this robust, reliable, high-performance technology.

Here are some quick SAN384B-2 and SAN768B-2 facts:

- Unleash the full potential of private or hybrid cloud storage with outstanding scalability, performance, and reliability
- Enable simpler, flatter, low-latency chassis connectivity to reduce network complexity, management, and costs
- Simplify and centralize end-to-end storage area network (SAN) management with comprehensive diagnostics, monitoring, and automation
- Protect investments in existing SAN fabrics and automation tools while reducing operational costs and minimizing business disruption
- Maximize performance for I/O- and bandwidth-intensive applications.

- SAN384B-2/SAN768B-2 specifications
- SAN384B-2 info on PartnerWorld
- SAN768B-2 info on PartnerWorld
- SAN384B-2/SAN768B-2 info on IBM.com

Figure S.9. IBM System Storage SAN384B and SAN768B (and links to more detail).

Cisco MDS

The Cisco MDS family provides a full suite of switches, directors, and specialty switches.

Cisco MDS 9100 series Switches

In this section, we will explore Cisco MDS 9100 series switches.

Cisco MDS 9124 Express

The Cisco MDS 9124 Express for IBM System Storage (Figure S.10) is designed to address the needs of small and mid-size organizations with a wide range of SAN capabilities. It can be used as part of a SAN solution with simple, single-switch configurations as well as larger, multi-switch configurations to support fabric connectivity and advanced business continuity capabilities. Fabric connectivity

- Cisco MDS 9124 specifications
- Cisco MDS 9124 info on PartnerWorld
- Cisco MDS 9124 info on IBM.com

Figure S.10. Cisco MDS 9124 Express for IBM System Storage (and links to detail).

capabilities can be the basis for infrastructure simplification solutions for IBM System i, IBM Power Systems, and IBM System x server and storage consolidation, and high-availability server clustering with System Storage disk storage arrays. Business continuity capabilities can help organizations protect valuable data with System Storage tape libraries and devices and IBM Tivoli Storage Manager data-protection software.

Here are some fast Cisco MDS 9124 facts:

- Provide a foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft Windows, UNIX, Linux, IBM AIX, IBM Virtual I/O, and IBM i operating systems
- Gain high-performance 1, 2, and 4 GB-per-second links with pay-as-you-grow scalability
- Ensure high availability with hot-swappable, dual power supplies, and nondisruptive firmware upgrades
- Support scalability and consistent service as the storage area network (SAN) grows
- Deliver added intelligence and business value with Enterprise Package and Data Center Network Manager advanced features.

Cisco MDS 9148

The Cisco MDS 9148 for IBM System Storage Multilayer Fabric Switch (2417-C48) is designed to provide an affordable, highly capable and scalable storage networking solution for small, midrange and large enterprise customers (Figure S.11). The switch provides line-rate 8 Gbps ports with high-performance, high-density, and enterprise-class availability. The switch is designed to offer outstanding value by providing flexibility, high availability, security, and ease of use at an affordable price in a compact, one rack-unit (1RU) form factor. With the ability to expand from 16 to 48 ports in eight-port increments, the Cisco MDS 9148 can be used as the foundation for small, standalone SANs, as a top-of-rack switch, or as an edge switch in larger, core-edge storage area network (SAN) infrastructures.

The Cisco MDS 9148 Multilayer Fabric Switch is designed to support quick configuration with zero-touch plug-and-play features and task wizards that allow it to be deployed quickly and easily in networks of any size. Powered by Cisco MDS 9000 NX-OS Software, it includes advanced storage networking features and functions and is compatible with Cisco MDS 9000 Series Multilayer Directors and Switches, providing transparent, end-to-end service delivery in core-edge deployments.

- Cisco MDS 9148 specifications
- Cisco MDS 9148 info on PartnerWorld
- Cisco MDS 9148 info on IBM.com

Figure S.11. Cisco MDS 9148 for IBM System Storage (and links to detail).

Here are some fast Cisco MDS 9148 facts:

- Extraordinary price/performance with up to forty eight 8 Gbps line rate ports in a compact 1 RU platform.
- Scales from 16 ports to 48 ports in eight-port increments.
- Redundant power supplies and fans and other availability features help minimize downtime and improve business resiliency.
- Built-in management, operational and configuration tools and plug-and-play features support quick deployment and easy end-to-end SAN management.
- All-in-one licensing with no hidden charges.

Cisco MDS Specialty Switches

In this section, we will explore Cisco MDS specialty switches.

Cisco MDS 9222i

A wide range of IBM System Storage medium-size and enterprise storage area network (SAN) IT simplification and business continuity solutions can be created with the Cisco MDS 9222i for IBM System Storage multiservice modular switch (Figure S.12). Infrastructure simplification solutions for the IBM Power Systems, System i, System p, System x, and System z families of servers include storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity solutions include data protection with IBM System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software; and disaster protection with IBM System Storage disk metro and global mirroring disaster recovery solutions.

Here are some quick MDS 9222i facts:

- Multiservice design for high performance business continuity solutions with Windows, UNIX, Linux, NetWare, IBM OS/400, and IBM z/OS servers

- Cisco MDS 9222i specifications
- Cisco MDS 9222i info on PartnerWorld
- Cisco MDS 9222i info on IBM.com

Figure S.12. Cisco MDS 9222i for IBM System Storage (and links to detail).

- Storage media encryption (SME) for secure encryption of data stored on heterogeneous tapes, virtual tape libraries, and disk arrays
- Cost-effective "green" switch design requires up to 27 percent less power per port
- Modular design provides "pay-as-you-grow" scalability and configuration flexibility
- Excellent availability with redundant, hot swappable components and non-disruptive firmware upgrades
- Intelligent network services such as Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, Mainframe and Data Center Network Manager (DCNM) Advanced Packages provide added intelligence and value.

Cisco MDS 9500 series Multilayer Directors

In this section, we will explore Cisco MDS 9500 series directors.

Cisco MDS 9506, 9509, and 9513

The Cisco MDS 9500 Series Multilayer Directors for IBM System Storage (Figure S.13) are director-class storage area networking (SAN) switches designed for deployment in scalable enterprise and service provider clouds to enable flexibility, resiliency, and reliability. Layering a comprehensive set of intelligent features onto a high-performance, protocol-independent switch fabric, the MDS 9500 Series Multilayer Directors address the critical requirements of large virtualized data center storage environments such as high availability, security, scalability, ease-of-management, and simple integration of new technologies for extremely flexible data center SAN solutions.

Sharing the same operating system and management interface with other Cisco data center switches, the MDS 9500 Directors can help enable smooth deployment of unified fabrics with high-performance Fibre Channel and FCoE connectivity for low total cost of ownership (TCO). Compatible with all generations of Cisco MDS 9000 Family Fibre Channel Switching Modules, the MDS 9500 Series Multilayer Directors can help provide outstanding investment protection.

The Cisco MDS 9513 offers up to 528 1, 2, 4, and 8 Gbps autosensing Fibre Channel ports and up to 264 10 Gbps Fibre Channel ports in an 11-slot modular chassis. The MDS 9513 provides up to 1056 Fibre Channel ports in a single rack.

The Cisco MDS 9509 offers up to 432 1, 2, 4, and 8 Gbps autosensing Fibre Channel ports and up to 216 10 Gbps Fibre Channel ports in a nine-slot modular chassis. The MDS 9509 provides up to 864 Fibre Channel ports in a single rack.

The Cisco MDS 9506 provides up to 288 1, 2, 4, and 8 Gbps autosensing Fibre Channel ports and up to 144 10 Gbps Fibre Channel ports in a six-slot modular chassis.

Here are some quick MDS 9500 director facts:

- Offers scalability to 192, 336 and 528 maximum Fibre Channel port count at 1, 2, 4, 8 and 10 Gbps Fibre Channel speed

a) b) c)

- Cisco MDS 9500 series Multilayer Director specifications
- Cisco MDS 9500 Series Multilayer Directors info on Partnerworld
- Cisco MDS 9500 Series Multilayer Directors info on IBM.com

Figure S.13. a) Cisco MDS 9506 for IBM System Storage, b) Cisco MDS 9509 for IBM System Storage, c) Cisco MDS 9513 for IBM System Storage (and links to detail).

- Multilayer architecture transparently integrates Fibre Channel, Fibre Channel over Ethernet (FCoE), IBM FICON, Internet Small Computer System Interface (iSCSI), and Fibre Channel over IP (FCIP) in one system
- 32- and 48-port 8 Gbps Advanced Fibre Channel switching modules designed to allow a port to be configured as either 1, 2, 4, 8, or 10 Gbps, consolidating all ports into the same Fibre Channel switching module
- High-performance Inter-Switch Links (ISLs) that provide additional availability at the fabric level; PortChannel capability allows users to aggregate up to 16 physical links into one logical bundle

- Supports all generations of Cisco MDS 9000 Family switching modules, providing outstanding investment protection
- Delivers comprehensive security and unified SAN management
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric.

Cisco MDS 9710 Multilayer Director

Cisco MDS 9710 Multilayer Director for IBM System Networking (Figure S.14) enables not only enterprise clouds—but business transformation.

Layering a comprehensive set of intelligent features over a high performance, protocol-independent switch fabric, MDS 9710 addresses the rigorous requirements of large, virtualized data-center storage environments with features such as high availability, extreme scalability, flexibility and security, and ease of management.

- Cisco MDS 9710 Multilayer Director specifications
- Cisco MDS 9710 Multilayer Director info on Partnerworld
- Cisco MDS 9710 Multilayer Director info on IBM.com

Figure S.14. Cisco MDS 9710 Multilayer Director (and links to detail).

Importantly, it enables the transparent integration of new technologies into the data center to provide highly flexible SAN solutions.

With the exponential growth of data in today's business environments, organizations must deploy large-scale SANs in the most efficient and cost-effective way possible.

Here are some quick Cisco MDS 9710 facts:

- Add next-generation capabilities to help future-proof the data center for cloud and massive amounts of data
- Meet scalability requirements while managing total cost of ownership (TCO) by scaling up to 384 Fibre Channel ports per chassis at 2, 4, 8, 10 and 16 Gbps at full line-rate speed
- Attain high availability with fully redundant components, including fabric cards, supervisors and power supplies
- Benefit from intelligent network features such as virtual storage area network (SAN) technology, access control lists (ACLs), intelligent frame processing and fabric-wide quality of service (QoS).

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.