



IBM Simplifies the Enterprise Data Center with Flexibility, Performance and Convergence

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Management Summary

Anyone reading the sports pages of their local newspaper (Internet edition, of course) is only too familiar with terms such as “salary cap”, “collective bargaining”, “budgets”, and “fiscal responsibility” that have replaced the normal football nomenclature of quarterback (QB) rating, sacks, et al. Payrolls for all of your local professional sports teams have come under scrutiny as owners try to maximize their investment while players try to maximize their income. There is only so much money to go around: some for the offense, some for the defense, and a whole lot for the QB. Trying to balance how much you invest in any single component of the whole is a never-ending challenge in trying to maximize the performance of the *team*. One thing is for certain: if you are trying to finish first, you must assemble the best offense, defense, and special teams that you can afford. Maximizing your investment is not unique to the sports arena, however. It is a common theme throughout every data center and every executive board in enterprises around the world.

The enterprise data center environment also consists of many components, including servers, storage, and networking, as well as an operating system and application software. Unlike the football team where the defense comes on when the offense comes off and the special teams perform when the offense and defense are on the sidelines, the IT staff must assemble an integrated solution that works together, deploying the best servers, the best storage, and the best networking, along with an operating system and application software, that provides an optimum platform for the mission-critical, enterprise applications. The question for the data center, however, is not “Can I afford to do this?” The real question is “Can I afford not to?” Of course, any *experienced* IT staff can send out RPQs for the best components and then integrate them, but at what cost? The enterprise data center needs to acquire a solution with the highest quality parts already integrated, at the best price possible. **Fortunately, for the data center there are many integrated solutions available. Unfortunately for the data center, there are too many integrated solutions available!** Finding the best solution for your specific processing environment is often a problem. This is where IBM has stepped up to the bar with a solution that can be crafted to meet your enterprise needs.

Using decades of experience in x86 and *BladeCenter* technologies, IBM has either developed or acquired all of the components that your data center needs to satisfy the requirements of the user community, employees, partners, and customers alike, who have a certain high expectation for service levels, response time and reliability. Combining the on-going innovation of *System x* with the latest in networking options, IBM has assembled a family of high-performance components from which the IT staff may choose, pre-assembled into an integrated platform, ready for turnkey deployment. To learn more about IBM’s latest solutions, please read on.

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Enterprise Data Center Requirements

In 2011, we are looking at a data center with an insatiable appetite for processing power, but, unfortunately, a limited budget and limited resources. The IT staff is under constant pressure to meet Service Level Agreements (SLAs) that were established in less harrowing times. This requires a constant refresh of the processing environment, not only in the data center, but throughout the enterprise as well.

Today's data center, working in an Internet economy, has no tolerance for downtime. Reliability and response time are critical. Customers, partners, and users alike expect improved service levels even while the IT staff is faced with a shrinking budget and as they struggle with an increase in the number of servers, both physical and virtual, additional users, and an increase in complex applications. Networking within a system and between systems is being stretched to the limit, with different demands depending upon the industry.

Financial institutions on Wall Street, as well as global banks, demand a higher level of performance and resiliency than ever before. The same is true in telecommunications, the entertainment industry and manufacturing enterprises of every kind. None of these have exactly the same environment. Every minute of downtime or lost message equates to lost revenue – millions of dollars per hour, in many cases, as customers go elsewhere to execute their transactions. If production comes to a stop because of a failure in the IT infrastructure, jobs will be lost – perhaps yours.

All of these industries are becoming more and more dependent on the technological advancements being made in digital technology, just to hold the status quo. Virtualization is enabling enterprises around the globe to improve the utilization of their IT resources. Advances in high-definition and 3-D techniques enable the entertainment industry to develop, edit, and deliver the TV shows and movies that we, as consumers, covet. The healthcare industry presents even more significant issues, especially where patient safety is concerned. The life of a patient may depend upon continuous access to an ever-expanding base of patient data. A failure in a network can have a catastrophic effect. *Rapid access to an x-ray or an MRI may be a life-saving event.* Any complexity in the infrastructure that hinders the delivery of that information can become a matter of life and death.

The complexity caused by an infrastructure cobbled together with servers, storage, and networking from disparate companies throughout a data center (or across the enterprise) can negatively affect your business at the bottom line. Server sprawl likely is inhibiting the performance of your enterprise. It raises the TCO of your IT infrastructure through wasted resources via poor server utilization, ineffective networking, excessive energy consumption, and an IT staff overburdened by the administration of a complex and under-performing architecture. Virtualization using the latest technology helps to offset these issues, lowers the TCO of the data center, and improves the commitment to the SLAs.

An aging and inefficient infrastructure leads to application and information complexity as it tries to conform to evolving business processes. This complexity can delay the deployment of mission-critical applications, increasing the time to revenue. This lost time and effort results in missed opportunities, as the competitor that has refreshed its IT architecture first becomes the “early bird” who steals your clients. Trying to manage an environment supplied by a myriad of vendors often results in more time and money being spent on administration than on new development. In fact, when 70% of the IT budget has to be dedicated to operations and maintenance, only 30% can be invested in business innovation.

What is needed to refresh and simplify data center operations? The answer to that is, well, “simple”. The IT staff may want to deploy an architecture pre-integrated by the vendor that virtualizes, consolidates, and automates all mission- and business-critical applications in the data center environment. In this way, they can implement a mission-critical, modular architecture with a common network fabric connecting servers with a turnkey infrastructure that can deliver the highest levels of reliability and flexibility.

To achieve this, the IT staff needs to deploy a solution with servers, storage and a network that communicates immediately with improved performance, reliability, and energy consumption. For those data centers that have deployed their own patchwork architecture, withstanding months of frustration and delays, there is a better way. With their latest announcement, IBM has provided their clients with an integrated solution based on choice, a myriad of x86 servers for

tower, rack, and blade environments, storage arrays to meet your needs, and network switches from their own Blade Network Technologies¹ (BNT), OEM products from Brocade and Juniper, and the availability to integrate Cisco switches into your *BladeCenter* requirements.

The IBM Integrated Solution

IBM has strived to create an efficient and innovative IT architecture to improve the economic infrastructure of the data center. IBM's solution consists primarily of an advanced two-socket *System x* server², which has been refreshed with the latest Intel *Xeon* microprocessor, the *Xeon 5600*, known internally as *Westmere EP*, to improve performance, five new network switches from a variety of vendors including IBM, and a wide choice of IBM storage arrays. IBM tests this integration, end-to-end, to facilitate deployment and maintenance. IBM has refreshed their *System x* servers for towers, racks, *BladeCenter*, and *iDataPlex*. By designing all of their servers to the same open standard, IBM has eased the migration and upgrade processes for the IT staff. In addition, IBM is providing the data center with the choice of multiple industry-leading networking solutions, integrated at the factory to facilitate deployment throughout the enterprise. The switches include offerings from IBM (BNT), Brocade, and Juniper.

System x Models

The *System x* two-socket servers are designed for higher efficiency, providing improved performance per watt for lower costs and better performance, with the Intel *Xeon 5600* series processors. All of the refreshed M3 models have been designed with more functionality – for the same price as their predecessors.

- An increase in frequency for the advanced CPU line provides higher performance;
- New 460W and 675W power supplies to improve energy efficiency;
- Low-cost 6-core CPUs now complement the 4-core basic CPU family; and
- The addition of high-performance, low-voltage DDR3-1333 memory at a standard

price point improves the ROI and lowers the TCO.

IBM's *System x* family provides hot-swappable disks, redundant hot-swap power supplies and fan modules for reliability. *System x* also has an *Integrated Systems Management* processor to increase server availability by continuously monitoring the server and alerting the IT staff of potential system failures. *System x* also comes with 3Gbps or 6Gbps³ integrated RAID support for RAID-0, -1, and -1E. Optional support is also available for RAID-10, -5, -50, -6, and -60.

The IBM *System x* family is ideal for virtualization and the enterprise looking to consolidate an inefficient architecture, or to deploy a server for web services, database management, e-business, or any number of video applications. *System x* comes with IBM's *Systems Director* for comprehensive systems management. All models have an energy-efficient design with IBM *Systems Director Active Energy Manager* to save electricity and cooling costs. IBM also provides operating system support for Microsoft *Windows Server 2008 R2*, *Red Hat* and *SUSE Linux*, and VMware *ESX Server*.

System x Rack Models

All four rack models of the *System x* family, the *x3620 M3*, the *x3630 M3*, the *x3550 M3*, and the *x3650 M3*, are dual-processor servers based upon the six-core Intel *Xeon 5600* series processor, with additional support for the four-core *Xeon 5500* series in the *x3620*. The *x3550* has a 1U format and is designed to serve an entry-level enterprise or workgroup for business applications. The rest of the family is configured in a 2U chassis. The *x3620* is designed to operate as a low-cost internal storage server for the growing business, while the *x3630* provides the lowest cost, multi-TB storage services. The *x3650* is a high-performance infrastructure server for business applications with Web interface.

The *x3620* and *x3630* support up to 96GB of memory along with three PCIe slots, while the *x3550* and the *x3650* support up to 192GB and two PCIe slots and two Gigabit Ethernet ports. The *x3550* and the *x3620* support up to eight SAS or SATA drives, with the *x3630* supporting up to (14) 3.5" drives or up to (28) 2.5" drives. The *x3650* supports (16) 2.5" drives.

¹ IBM acquired BNT in July 2010.

² See [The Clipper Group Navigator](http://www.clipper.com/research/TCG2010012.pdf) entitled *IBM Introduces More-Efficient x86 Servers – Improving Virtualization, Energy, Lowering TCO* dated March 26, 2010, and available online at <http://www.clipper.com/research/TCG2010012.pdf>.

³ Model dependent.

System x Towers

Updates for the IBM System x tower family apply to two models: the *x3400 M3* and the *x3500 M3*. They are 5U rack-mountable towers designed to provide optimum performance, availability, scalability, and ease-of-use at a lower price. They offer a large and flexible storage capacity for increased scalability and are designed to reduce energy costs and ease management.

They can be configured with up to two Intel *Xeon E5600* CPUs with up to 12MB of cache per processor. The new *x3400* supports both the 4-core *Xeon E5620* running at 2.40GHz and the 6-core *Xeon X5675* running at 3.06GHz, while the new *x3500* supports the 4-core *Xeon E5687* running at 3.60GHz and the 6-core *Xeon X5690* running at 3.46GHz. The *x3400* can deploy up to 128GB of DDR-3 1333MHz RDIMMs, while the *x3500* can support up to 192GB. Both models can support up to 48GB of DDR-3 1333 MHz UDIMMs. Both also have a dual integrated Gigabit Ethernet port. In addition, the *x3400* has five PCIe slots and one standard PCI slot, while the *x3500* has six PCIe slots and one standard PCI slot. Additional PCI-X or PCIe slots can be configured.

These servers have a very flexible disk configuration. The data center can deploy the *x3400* with four 3.5" simple-swap SATA drives or four 3.5" hot-swappable SATA/SAS drives. As an alternative, the IT staff can deploy 8 or 16 2.5" hot-swappable SATA/SAS devices. In addition, the *x3400* can be configured with eight 3.5" hot-swappable SAS/SATA drives. These towers can support up to 16TB of internal storage. Additionally, the *x3500* can be configured, optionally, with up to 16 2.5" hot-swappable drives as standard or up to (24) 2.5" or (8) 3.5" hot-swappable drives and (4) 3.5" simple-swap.

BladeCenter

IBM has refreshed two blades in their *System x BladeCenter (BC)* family⁴: the *BladeCenter HS22* and the *BladeCenter HS22V*. The *HS22*, with up to 192GB of memory, provides the data center with flexible options to support a broad spectrum of workloads, including enterprise applications and virtualization, based upon the enhanced technology provided by Intel's high-performance Xeon 5600 series processors, running at speeds of up to 3.6GHz, and two,

four, or six cores. It can be customized and deployed quickly with IBM's enterprise-class reliability features to keep your BladeCenter operational. The *HS22V*, on the other hand, has been designed specifically for virtualized environments with up to 288GB of memory, with speeds of up to 1333MHz, and 4MB of L3 cache, optionally scalable to 12MB, to enable more and larger virtual machines to be activated. It is available with either the Xeon 5500 or 5600 series processors.

Both blades are configured as single-wide units, with two CPU sockets. The *HS22V* is configured with up to two internal solid-state drives (SSDs) with a capacity of up to 100GB, for improved I/O and energy efficiency, while the *HS22* can be configured with either SSDs or HDDs, for a maximum internal capacity of 1TB. Both blades come with IBM's System Director, Systems Director Active Energy Manager, and the Integrated Management Module.

iDataPlex

Designed for the high-performance data center, iDataPlex provides the enterprise with a platform that is both space- and energy-efficient. The *iDataPlex dx360 M3*⁵ has an innovative half-depth solution for maximum density and efficiency, reducing the airflow required to cool the system. With the newest Intel Xeon processors installed, it delivers outstanding performance and flexibility to fit your data center's needs, and is easy to manage.

This new version of iDataPlex dx360 M3 comes standard with two Intel Xeon 5600 series processors running at 3.2GHz. It comes with up to 192GB of DDR-3 1333 memory, in 16 DIMM slots, and with up to 12MB of cache. It has up to two PCIe x16 expansion slots and has a half-depth 2U Flex chassis or a 3U storage chassis. There are (8) 2.5" bays in the 2U configuration, supporting up to 10TB of storage, and 16 bays in the 3U form factor, for a maximum of 24TB in the storage chassis.

Networking Options

IBM has made a commitment to the data center to provide an integrated solution, from the top of the rack to the bottom. To do this, they have implemented virtualization enablers to achieve networking leadership. System net-

⁴ There are five BladeCenter configurations: *BC-S*, *BC-H*, *BC-E*, *BC-T*, and *BC-HT*.

⁵ See [The Clipper Group Navigator](http://www.clipper.com/research/TCG2008024.pdf) entitled *IBM Changes Paradigm for "MegaPlex" Provisioning*, dated April 25, 2008, and available online at <http://www.clipper.com/research/TCG2008024.pdf>.

working plays a key role in IT buying decisions. IBM factory-tests their comprehensive portfolio of networking options for all of their servers and storage products, end-to-end, from the server to the network. The data center has a choice of networking options to best-fit their environment. IBM does not force-fit one particular product to all solutions. Because IBM works with open standards, the data center will find it easy to deploy, migrate, or upgrade and, because they offer multiple networking options, the data center can utilize a single point of contact for product acquisition and service. This enables the data center to reduce networking costs, lowering the IT infrastructure TCO, with low-latency, low-power, reliable, and open network options.

Blade Network Technologies

Last summer, IBM announced plans to acquire BLADE Network Technologies (BNT), in order to provide software and devices that route data and transactions to and from servers. BNT has a proven record of providing sustainable technology innovation for blade server and top-of-rack switches, as well as software to virtualize and manage cloud computing and other workloads. Customers span 26 industry verticals, including automotive, telecom services, education, government, healthcare, defense and finance, including 50% of the Fortune 500 data centers. IBM and BNT have been partners for the past decade, resulting in thousands of joint clients. In fact, over 50 percent of IBM System x BladeCenters currently attach to or use BNT products. With this announcement, IBM adds a pair of BNT switches as additional options for BladeCenter: the IBM *BNT RackSwitch G8264* and the IBM *BNT RackSwitch G8052*.

Rackswitch G8264

With market-leading performance, the Rack-Switch G8264 is a lossless switch optimized for high-performance computing and supports a throughput of 1.28Tbps, for massive scalability with a latency of only 1.1ms. It is very dense, with up to (64) 10Gb/40Gb ports in a 1U form factor. It has a feature-rich design with key virtualization features such as CEE/FCoE, high availability, and enterprise-class Layer 2 and Layer 3 functionality. It has (4) 40Gb QSFP+ ports for back-end processing. It has IBM *Virtual Fabric* support and is optimized for *VMware* environments, consolidating the number of multiple I/O ports onto a single dual-port 10Gb adapter. This adapter can be divided into eight virtual NICs, creating dedicated virtual pipes for

optimal performance.

BNT Rackswitch G8052

With a low-cost of only \$10,999, the Rack-switch G8052 is a top-of-rack switch that can deliver line-rate Layer 2/3 performance for up to 48 10/100/1000 Base-T ports and up to four 10 Gb Ethernet SFP+ ports. It has a low latency of less than 2 microseconds and comes with hot-swap redundant power supplies and fans standard for increased reliability. The G8052 matches the servers with front-to-rear (or rear-to-front) airflow.

Brocade

IBM can provide a variety of switches from Brocade that are available in 24-port and 48-port models and designed for wire-speed, non-blocking performance in a compact 1U form factor. These switches are designed to support next-generation campus convergence of video, voice, and data by providing a single-cable solution for devices, such as voice-over-IP phones, video surveillance cameras, and wireless access points. Multiple switches can be stacked and managed as a single logical switch to enable pay-as-you-grow expansion. The high-performance and reliability features also make the switch ideal for data center top-of-rack server and iSCSI storage connectivity. IBM can provide the IBM *Ethernet Switch B48Y* from Brocade to support 1GbE/10GbE networks, an easy to manage data center switch for edge connections. The B24X is a compact, high-performance, high-availability, and high-density 10 GbE solution designed for mission critical data centers, large enterprises, and HPC requirements. With an ultra-low latency, cut-through, non-blocking architecture, full wire-speed throughput, this switch provides a cost-effective solution for server or compute-node connectivity.

Juniper

The IBM *Ethernet Switch J48E*, from Juniper, runs Juniper Networks' *JUNOS* operating system and was designed for high-performance server access deployments. A single switch can be deployed initially. As requirements grow, *Virtual Chassis* technology allows scalability for up to nine additional switches to be interconnected over a 128 Gbps backplane and managed as a single device. Modular GbE and 10 GbE uplink module options enable the Virtual Chassis technology to be extended to switches in different racks or even in different data centers.

The J48E provides a single point of man-

agement in support of up to 480 server access ports, lowering management and administrative costs, and thus, lowering the TCO of the IT infrastructure. Designed in a 1-Rack-Unit format, the J48E has simplified cabling and modular rack-level efficiency for ease-of-use. It has JUNOS operating system and redundant components for reliability, increasing the MTBF⁶ and lowering the MTTR⁷.

Conclusion

By themselves, IBM's server offering and their networking menu provide the IT staff with outstanding options for the deployment of the data center infrastructure. Together, they provide the IT staff with a highly-performant, scalable, converged infrastructure to enable an easy deployment throughout the enterprise. With these new options, IBM has extended the choices available to tailor an integrated turnkey solution.

With the new servers, based upon Intel's Xeon 5600, IBM provides the data center with the additional performance and functionality that it needs to ensure growth while retaining the existing IT environment for years to come. With these new network switches, IBM facilitates the convergence of servers, storage, and network communications for an extended variety of configurations. If your data center needs to improve performance and lower the TCO of the IT infrastructure, you need to look into the solutions available from IBM. One of them may be exactly what you have been seeking.



⁶ Mean Time between Failures.

⁷ Mean Time To Repair.

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