

TCO BENEFITS OF WIRELESS SWITCHING IN AN IBM eServer™ BladeCenter® ENVIRONMENT

WHITE PAPER

January 2006

Symbol Technologies and IBM have partnered to offer the first wireless LAN on a IBM eServer BladeCenter. This white paper examines the unique advantages and benefits of this pairing — from reliability to deployment and management simplicity — and how the synergistic architectures of these two best-in-class technologies bring a new level of savings in total cost of ownership to wireless networking.

INTRODUCTION: TRUE SYNERGISTIC TECHNOLOGIES COMBINE TO DELIVER A SUM THAT IS GREATER THAN THE PARTS

Symbol Technologies, creator of the industry's leading wireless switch architecture, and IBM, developer of the blade server technology, have partnered together to create a new business model that combines these best of breed technologies in a unique product offering to deliver significant value and innovation to the enterprise. Together, the Symbol and IBM Solutions alliance delivers the first truly wireless "site in a box" by combining wired and wireless technology with server hardware in a simple, cost-effective, easy to deploy and manage package.

Symbol's wireless switch sets the industry standard for next-generation enterprise wireless networking, offering more functionality than first generation wireless LANs at a lower cost. The IBM eServer™ BladeCenter® sets the standard for blade server architecture by delivering low-cost high performance servers with an extremely high level of management simplicity and reliability. Individually, both best-in-class products are smart enterprise investments. Both offer centralized architectures that reduce capital expenditures, deployment costs, and ongoing management costs. Both scale and grow easily to meet growing enterprise demands from a capacity and functionality perspective. Both deliver outstanding reliability and maximum uptime.

When Symbol's wireless switch meets the IBM eServer BladeCenter server, the result is a literal wireless-LAN-in-a-box — a plug and play wireless LAN server that can be installed in the IBM eServer BladeCenter chassis in minutes. The natural marriage of these two technologies into the WS5120 leverages the synergies of each, and amplifies the benefits, delivering a sum that is greater than the parts: a world-class wireless LAN that offers a new level of implementation and management simplicity, reliability — and total cost of ownership (TCO).

The Wireless LAN on a Blade solution is designed to support any enterprise with one or more large physical environments that require multiple applications. This profile can be applied to a wide variety of enterprises within industries, from retailers and wholesalers, hospitals and banks, to corporate offices, manufacturing plants, campuses and many more.

SUPERIOR WIRELESS NETWORKING: SYMBOL'S WIRELESS SWITCH

The WS5120 offers the same features and functionality as Symbol's top of the line WS5100 Wireless Switch. Symbol's award winning WS5000 series of wireless switches are in use in thousands of companies around the world, providing mission critical wireless connectivity to mobile workers. The WS5120 is a second-generation WLAN, offering the power of centralized intelligence, rather than the distributed intelligence of first generation WLANs. Where first generation WLANs consisted of 'thick' intelligent access points, second generation WLANs concentrate the intelligence in a wireless switch, which then distributes the intelligence to 'thin' access ports. This architecture delivers outstanding investment protection, eliminating the need for a forklift upgrade to support new features, functionality or standards — upgrading the WS5120 automatically upgrades all associated access ports.

The WS5120 delivers true enterprise-class wireless networking:

End-to-end-layered security

- Comprehensive security mechanisms including access-control, authentication, and encryption can be deployed throughout the enterprise network: the wireless network edge, the wired enterprise network, the servers, and client devices.
- Centralized architecture enables a rapid and cost-effective upgrade path to support new security standards as they are developed. First generation WLANs traditionally require forklift upgrades to support new standards.

Centralized management

- With powerful centralized management capabilities, IT can manage hardware, software configuration and network policies, including remote configuration and management all access ports — at all distributed locations, all from a single point. With first generation WLANs, each and every access port is physically managed, from configuration to troubleshooting.

Scalability

- Adding capacity as your business grows is easy. The WS5120 scales easily to provide wireless connectivity throughout your enterprise, regardless number of employees you need to support or how demanding your applications may be. To meet additional capacity, simply add incremental Access Ports (each WS5120 supports up to 48 Access Ports) or additional WS5120 Wireless Switches.

Reliability

Two factors deliver outstanding reliability:

- The WS5120 leverages standard multi-layer networking principles, offering an overlay architecture that enables superior integration with the wired network. Instead of the stand-alone ad-hoc approach of first generation WLANs, the WS5120 preserves network integrity, extending wired network levels of predictable high availability and redundancy to the wireless LAN.
- Symbol's unique mobility features improve the quality and dependability of the wireless connection to the user. For example, Load Balancing and Pre-emptive Roaming work hand in hand to ensure devices roam to the next Access Port before connection quality erodes. With Power Save Protocol users enjoy maximum device battery life per shift, eliminating the need to spend time locating and changing batteries mid-shift, the associated employee downtime, and the need for IT to purchase and manage a larger pool of spare batteries. And Per Device Bandwidth Allocation-Weighted Fair Queuing ensures quality of service for consistent application performance during peak periods of network congestion.

Upgradeable

- The WS5120 is fully upgradeable. Whether you want to add support for new security or radio standards, or new Symbol features and functionality, the simply upgrade the firmware in the WS5120. The centralized architecture does the rest, pushing the new features out to the appropriate network hardware, such as Access Ports.

Low total cost of ownership

- Symbol's unique combination of features and functionality combine to deliver a very low total cost of ownership — from the elimination of manual management and forklift upgrades to maximum network and user 'uptime'.

SUPERIOR SERVER TECHNOLOGY: IBM eServer BladeCenter

The IBM eServer BladeCenter offers a powerful and cost-effective centralized approach to server architecture. Traditionally, servers are placed in a rack, and each server is a self-contained unit with its own infrastructure, including a power supply, cooling fans and more. IBM's alternative approach replaces the traditional rack with an IBM eServer BladeCenter chassis, and traditional servers with IBM eServer BladeCenters. The chassis provides power, cooling fans, a common high-speed I/O bus, floppy drives, ports and more for all blades to share. The ultra-thin blades are equipped with the latest in processing power, and since the need for a power supply, fan and other typical server infrastructure is eliminated, 14 blades can fit in the typical 7U server rack. Optional blades can be added for storage, Ethernet switching and other common functions to create a consolidated hardware implementation for most IT components.

This unique server architecture delivers:

- **More processing power per square foot:** Twice the servers can fit in the same space.
- **Less cabling:** A single set of cables replaces much of the need for cabling for individual servers.
- **Fewer components to manage, repair or fail:** Eliminating the need for power supplies, fans and more for each server eliminates hundreds or thousands of elements from the IT infrastructure.
- **Lower power and cooling requirements:** Consolidation of power sources and design efficiencies translate into less power for more servers.
- **Centralized management:** A single management system eliminates the need for IT to log on to multiple servers to monitor the network as a whole. And automated monitoring and diagnostics literally predict pending failures, enabling replacement of parts before network service is impacted.
- **Fault tolerance by design:** Warm-standby switch support of the WS5120 combines with the simple plug-and-play server deployment functionality and back-up server support architecture to deliver superior fault tolerance — and assurance of consistent and continuous wireless network service.

SUPERIOR TCO

The WS5120 leverages the synergistic centralized architectures of Symbol's wireless switch-based WLAN and the IBM eServer BladeCenter environment, effectively reducing hard, soft and indirect costs. The following sections examine the respective complimentary features of the Symbol wireless switch-based WLAN and the IBM eServer BladeCenter, and how they drive the costs down to deliver a truly superior TCO.

Hard Costs

The WS5120 significantly reduces the typical acquisition costs associated with implementing a wireless LAN:

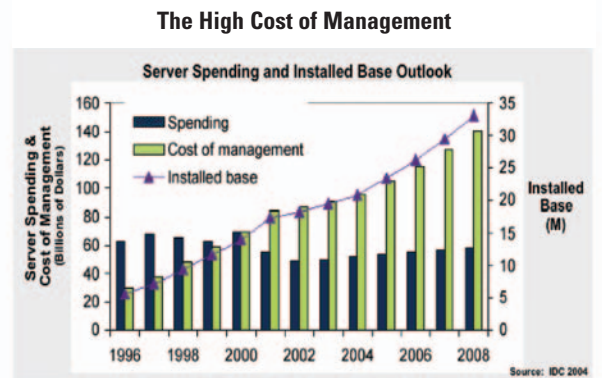
Hard Cost Reduction: Lower Capital Expenditures

Symbol WS5120 Wireless Switch	IBM eServer BladeCenter
Equipment Costs: Lower CAPEX (Capital Expenditures)	
<p>Wireless networking equipment costs are lower. Low cost Access Ports replace high-cost Access Points. The need to purchase expensive intelligent access points that are replicated throughout the enterprise is eliminated, replaced by very low-cost low-maintenance Access Ports. The addition of a wireless switch to the total number of devices (the Wireless Switch plus the Access Ports) reduces the total capital and implementation cost, often dramatically, since only the switch itself carries the cost of a processor. For example, a WS5120 with 12 Access Ports is approximately \$4,000, compared to \$5,000 for 12 802.11a/g comparable access points — a 20% savings.</p>	<p>Fewer components to purchase — lower hardware costs. The IBM eServer BladeCenter chassis provides common server infrastructure, such as fans and power supplies. The blade servers no longer need to include this infrastructure, reducing the complexity and cost of the blade servers compared to traditional 1U servers. While cost per blade server varies depending upon the configuration, blade servers can be up to 50% less than their traditional standalone counterparts.</p>
<p>Reduced cabling costs. Power-over-Ethernet eliminates need and cost to run outlets and electrical cabling to provide power for Access Ports.</p>	<p>Reduced rack costs. Twice the servers can fit in the same space. A single IBM eServer BladeCenter chassis takes the same space as a traditional 7U server rack, but accommodates 14 servers.</p>

Soft Costs

The WS5120 significantly reduces soft costs in a number of areas, including deployment and management as well as power and space requirements. The cost of management is spiraling exponentially to the capital investment in servers (see Figure 1). Features in the WS5120 and the IBM eServer BladeCenter combine to significantly reduce the manpower traditionally required to deploy and manage the wireless network — and the associated costs. In addition, less floor space and less electricity are required to support the wireless network infrastructure. (Exact savings to the enterprise is dependent upon individual site environments).

Figure 1



Driven by the increasing numbers of physical systems, systems management has become the dominant component of IT costs and is growing rapidly.

Soft Cost Reduction: Lower Operational Expenses

Symbol WS5120 Wireless Switch

IBM eServer BladeCenter

Deployment Costs (Initial Provisioning)

Lower deployment costs. In a traditional first generation WLAN, each access point must be manually configured prior to physical installation. However, the low cost Access Ports are configured remotely and centrally, enabling all or groups of Access Ports to be configured at the press of a button, dramatically reducing deployment time and costs.

Lower deployment costs. The separate components traditionally required to deploy a wireless network — server, wireless switch, Ethernet switches, wireless security and applications, and more — are incorporated into blade implementations that can be literally deployed in minutes in an IBM eServer BladeCenter chassis. And once the plug-and-play WS5120 slides into place in the BladeCenter chassis and is connected to the back plane, it is automatically discovered by management software, and server installation is nearly complete — the common infrastructure eliminates the need for additional cabling. In addition, this architecture can often be used to reduce the total equipment needs at the site, (for example, servers and Ethernet switches) by consolidating the functionality of multiple standalone devices into single, high-performance blades.

Reduced cabling costs. Streamlined centralized design eliminates 83% of the cabling.*

Management Costs (Ongoing Administration)

Lower management costs. First generation wireless LANs require IT to physically travel to any access point that is malfunctioning to check for status lights as well as troubleshoot the device. In addition, every access point requires an individual unique IP address, further complicating management. By comparison, the WS5120 enables centralized remote management of the entire wireless LAN. IT can easily see all WS5120 Wireless Switches, all associated Access Ports and wireless client devices, as well as network statistics to support troubleshooting and proactive steps to avoid network issues. In addition, only one IP address is required for each WS5120 (Access Ports are assigned dynamic addresses by the WS5120). The result is a dramatic decrease in the amount of time required to manage the wireless LAN, freeing IT for other more business critical tasks.

Lower management costs. In an IBM eServer BladeCenter environment, a single common interface is utilized to manage, configure and monitor all blades. In a traditional server environment, IT must log onto each individual server with the associated required management software.

In addition the Predictive Fault Analysis (PFA) tool constantly monitors blades for signs of developing hardware issues related to hard drives, memory, processors, fans and more. This information is sent to IT as early as 48 hours before an actual failure occurs. IT can then instantly hot swap the failing components or server, eliminating costly downtime.

Savings in management costs are estimated at 25% to 40%*.

Electricity Costs: Power and Cooling

Lower Electricity bills. IBM eServer BladeCenters are designed to minimize operational power requirements as well as minimize heat output, translating into less electricity needed to power and cool the devices. The average single blade requires 20% less power than a 1U traditional rack mount server*.

Floor Space

Less floor space required. Datacenter floor space can cost as much as \$5,000 per square foot annually*. The compact design of the IBM eServer BladeCenter enables double the computer power in the same space (each IBM eServer BladeCenter chassis holds 14 servers and takes the same amount of space as a traditional 7U rack mount server unit), enabling enterprises to cut data center space requirements in half and reallocate to other business areas as needed.

* 'Blades Cut TCO, Sharpen Data Center Efficiency?', April 2005, Gabriel Consulting Group, Inc.

Indirect Costs

Hard costs represent less than a third of a three year total cost of ownership*. The remainder is a combination of soft and indirect costs. While indirect costs are the toughest to track and measure, it is these costs that can contribute to your bottom line, or spiral high enough to impact business profitability. For example, the efficiency of centralized management can provide your time-starved IT department with the ability to focus on other strategic projects that could positively impact the business. Conversely, unscheduled network downtime can translate into lost revenue due to sales that cannot be processed, and lost productivity when workers cannot access mobile applications to perform tasks.

Just one minute of downtime can bring staggering losses. Consider the following table, which lists the average cost of downtime in various industries.

Even a slight increase in unscheduled network downtime can amount to staggering losses — in either sales or worker productivity. Network uptime averages are defined as follows:

- 99.999% — best-in-class
- 99.9% — good
- 99.5% — above average
- 99% — average
- 98% — below average

Figure 2

Average Cost per Hour of Unscheduled Network Downtime		
Industry	Cost per hour of unscheduled downtime	Cost per minute of unscheduled downtime
Banking	\$900,000	\$15,000
Pharmaceutical	\$1,000,000	\$16,666
Retail	\$1,100,000	\$18,333
Manufacturing	\$1,600,000	\$26,666
Energy	\$2,800,000	\$46,666

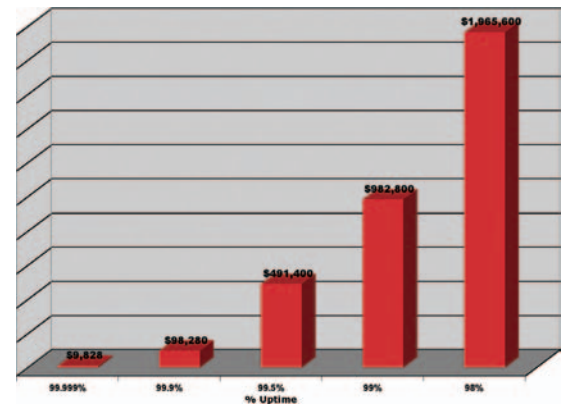
Source: IT Performance Engineering and Measurement Strategies: Qualifying Performance Loss, Meta Group, October 2000

The following charts reveal that, **even on a system with an average uptime of 99%**, the cost of lost productivity and lost sales can easily amount to millions.

(Note: The following charts were computed via standard calculations to assess the dollar impact of lost productivity and sales**.)

Figure 3

**Unscheduled Network Downtime:
The Cost of Lost Productivity**

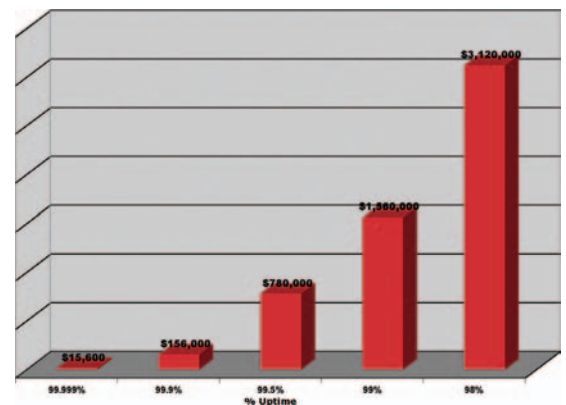


Assumptions:

- 500 affected users
- 3-shift workday
- \$25/hr. with 26% loaded in for taxes and benefits

Figure 4

**Unscheduled Network Downtime:
The Cost of Lost Sales**



Assumptions:

- 500 affected users
- 3-shift workday
- \$50/hr. average profit per person

Best-in-class uptime: the best protection for productivity and revenue

As stand-alone products, Symbol’s WS5120 Wireless Switch and the IBM eServer BladeCenter are designed to deliver maximum reliability and superior performance. The unique combination of each product’s strengths come together in the WS5120 to provide maximum protection against wireless network downtime — and the resulting negative impact on your bottom line.

Indirect Costs: Productivity and Profitability Protection

Symbol WS5120 Wireless Switch	IBM eServer BladeCenter
Reliability and Performance	
<p>Robust management/system visibility. The embedded management system in Symbol’s Wireless Switch provides outstanding visibility into wireless network traffic, policies, security, and all associated hardware, including all WS5120 wireless switches and associated Access Ports and mobile devices. This broad visibility into the wireless network provides the information needed to proactively manage the wireless LAN for peak performance and uptime. Problems are easily spotted and rectified before they impact connectivity, protecting the productivity of mobile employees and company profitability.</p>	<p>Robust management/system visibility. The management system keeps a constant eye on the many hardware components, from the hard drives, memory and processors on the blades to the fans, ports, and power supplies on the IBM eServer BladeCenter chassis. The system not only automatically monitors the many server elements, but also automatically alerts staff of developing issues. The result is truly maximum uptime with minimal effort. IT staff is not required to spend any time monitoring the system manually, yet can easily eclipse many pending issues before they happen by simply replacing parts that are showing signs of impending failure.</p> <p>Advanced diagnostics enable the system to predict software failures and automatically re-boot when necessary to maintain throughput levels.</p>
<p>Automated backup and restore: The WS5120 is commonly implemented with a standby Blade to automatically recover in the event of a hardware failure. This provides extremely high availability with no user intervention required as well as a non-disruptive maintenance and upgrade path.</p>	<p>Enhanced centralized management via IBM Director. Support for IBM Director enhances centralized management capabilities to include the ability to view and track detailed hardware configurations, as well as monitor usage and performance of many system components, from processors to disks, memory and more. And Upward Integration Modules (UIMs) allow enterprises to report IBM Director information upstream to the enterprise’s standard management system of choice (for example, Tivoli Management Framework, HP OpenView, Microsoft® SMS and more).</p>
<p>Integration to enterprise management. The Compliant with industry standards, the WS5120 is easily and completely integrated into the enterprise’s upstream management systems via a rich SNMP MIB.</p>	<p>Increased application performance. State-of-the-art Xeon processors deliver a higher level of computing power, delivering improved application performance.</p>
<p>Wireless connection quality. Symbol’s unique mobility features are designed to deliver maximum wireless connection quality, keeping users up and running and connected to mission critical business applications. Features include:</p> <ul style="list-style-type: none"> • Ensuring that users roam before connection quality degrades and applications are unable to perform • Providing quality of service for multiple applications during peak periods of wireless network congestion, ensure proper bandwidth for peak performance of critical applications such as voice and video • Power saving features maximize battery life in mobile devices <p>These features combine to eliminate dropped connections and time spent re-booting and/or reconnecting to applications.</p>	

Full Redundancy Support

<p>Full Redundancy Support. In the unlikely event of a system failure, the WS5120 automatically and seamlessly switches over to a redundant WS5120, ensuring continuous wireless connectivity and business operations.</p>	<p>Full redundancy support — hot swappable. The blade architecture is designed to deliver maximum uptime. All systems components are hot-swappable. In minutes, IT can easily install a new blade server to replace a faulty or failing device. And since each BladeCenter has redundant components, failing power supplies, cooling fans and more can be replaced instantly. In order for this same level of redundancy to exist in a traditional rack environment, each 1U server would need to be configured with multiple power supplies, fans and more, adding capital costs as well as increasing power requirements. And with IBM management software, a majority of the dynamic capacity and recovery capability can be fully automated, further reducing administration costs.</p>
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MAXIMIZE YOUR WLAN INVESTMENT WITH THE BEST OF BOTH WORLDS

The WS5120 combines the strengths of Symbol's Wireless Switch and the IBM eServer BladeCenter architecture, enabling enterprises to:

- Implement and support wireless networking at a lower cost
- Respond quickly to wireless application and environmental changes
- Quickly implement new features and functionality to take immediate advantage of new business opportunities
- Achieve the highest available levels of service, manageability and security

The WS5120 enables the extension of mission critical business applications to the point of work. Mobile workers can capture real-time information that provides management with a real-time view of the enterprise. Processes are streamlined, automated and error-proofed. And profitability is improved.

And the synergistic architectures of Symbol's wireless switch-based WLAN and the IBM eServer BladeCenter technology deliver a wireless LAN that offers faster deployment, the highest level of integration with the wired network, and the highest level of wireless LAN availability to protect your productivity and profitability — with the lowest acquisition price and total cost of ownership, as well as the fastest return on investment.

About Symbol Technologies

Symbol Technologies, Inc., The Enterprise Mobility Company™, is a recognized worldwide leader in enterprise mobility, delivering products and solutions that capture, move and manage information in real time to and from the point of business activity. Symbol enterprise mobility solutions integrate advanced data capture products, radio frequency identification technology, mobile computing platforms, wireless infrastructure, mobility software and world-class services programs under the Symbol Enterprise Mobility Services brand. Symbol enterprise mobility products and solutions are proven to increase workforce productivity, reduce operating costs, drive operational efficiencies and realize competitive advantages for the world's leading companies. More information is available at www.symbol.com



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