



The Power of Compatibility

Executive Overview

IBM BladeCenter® is not a specific product; it is a product line—or better yet, a vision. When IBM released BladeCenter in November of 2002, we wanted to deliver a set of standards that would allow us to support an architecture far longer than anyone had done in the past. Why was this so important? The answer to this question varies depending on your application. For clients using it to run their business, every time something changes there is risk involved with putting new items into production environments.

Compatibility means that even as technology races forward, much of what you have tested (chassis, management, fabric support, etc) stays the same. For IT vendors like IBM, long-term compatibility means we can easily attract the industries' leading technology companies to design for the platform. These fabric vendors and software partners want assurance that the investments they make are going to be viable for the long term. We are now three years down the road toward this new vision in IT, and the map that guided us back in 2002 is the same one we are using today. That very first IBM BladeCenter chassis we shipped is capable of supported even the newest Intel, AMD, and PowerPC processors (along with the increased power and cooling that come with them), the latest communication switches (Infiniband, 4Gb fibre, Myrinet), and more software partnerships than one can count. Simply put, our vision for what a bladed infrastructure needed to provide allowed us to design a platform capable of accommodating future advances in technology without requiring new chassis for years to come.

Technology changes so quickly that new additions to the BladeCenter family come quarterly, if not monthly. Maintaining the compatibility and investment protection is not an easy task, but the value it brings is a cornerstone of what IBM is trying to deliver. We have shared our plans with you for BladeCenter H and the future of our product line, and we ask that you look at our track record of delivering compatibility and “future-proofing” as evidence that we can deliver. A quick check of the competitive landscape shows that other blade vendors did not place effort on this aspect of their design. Every time they move to a new generation, their customers have incompatible technology, reducing the value of the investment they have made.

The aim of this paper is to share with you the importance of something as simple as compatibility. In an IT world where things are changing faster than a 10GB network there is a great deal of comfort involved with knowing the foundation on which you are running your business is rock solid.

A History of Making it All Work Together

Since the introduction of the BladeCenter chassis (IBM Machine Type 8677) in 2002, there has been an incredible amount of change in the technology. Yet, BladeCenter itself has been able to adapt and continues to be the platform of choice for most blade customers today. *Table 1* shows just a few examples of how adaptable and forward-thinking BladeCenter was and continues to be:

Function Available	BladeCenter in November 2002	BladeCenter in 2005	BladeCenter Today
Number of chassis in portfolio	One: BladeCenter	Two: BladeCenter and BladeCenter T. Two very unique chassis offerings that share common switches and blades	Three: BladeCenter, BladeCenter T, and now BladeCenter H. Three unique offerings match customer requirements for density, cost, performance, and environment.
Ecosystem available	IBM was the main developer	Dozens of partners delivering parts for the	Hundreds of partners, due to the adoption of

Function Available	BladeCenter in November 2002	BladeCenter in 2005	BladeCenter Today
		BladeCenter, with over 700 more signed up to receive the technical specs for future development	IBM's Open Spec announcement ¹ and the formation of Blade.org
Processor blades available	2-way Intel® Xeon® processors only	2- and 4-way Intel, 2-way AMD™ Opteron™, and 2-way IBM PowerPC®	Even more options all supported across all three chassis
Processor power level	55W processors	105W processors	Future holds 120W+ processors
Ethernet offerings	IBM-branded, Layer 2 only, copper uplinks only	Large selection of state of the art offerings from Cisco and Nortel that include Layer 2-7 functionality and a choice of copper or Fibre Channel uplinks	Even more options, including 4X Infiniband, 10Gb Ethernet, and more PCI-Express based offerings
Fibre Channel offerings	IBM-branded only	Large selection of state of the art offerings from QLogic, Brocade, and McDATA	Even more options including SMB optimized 10 port switches with even more vendor offerings coming soon
Maximum speed of storage fabric	1Gbps maximum	2Gbps and 4Gb full fabric	Even faster, with speeds to 10Gb

A great example of how IBM has taken compatibility to a level that no other vendor has achieved is the coexistence of BladeCenter and BladeCenter T. These two chassis are quite different in their purpose and the markets they serve, but they share a common set of switch and blade offerings. Consider that BladeCenter is 7U in height and supports up to fourteen blades. It runs on AC input, is 28" (71cm) deep and operates in typical data center temperature and cleanliness environments. By comparison, BladeCenter T is 8U and supports eight blades, offers a choice of either AC or DC power, is only 20" (51cm) deep, operates at extended temperatures up to 50 degrees C, allows for air filtration, and offers NEBS and ETSI compliance for placement into more "rigorous" environments. If IBM can make the same set of switches and blades work in these two vastly different chassis today, you can be confident that we can do the same going forward.

The amazing changes we have seen in fabric speeds, performance, and storage technology are now merely speed bumps on the road. Clients that standardized on BladeCenter know the new technology can easily integrate into their current architecture as it becomes available. This nearly seamless introduction is in direct contrast to most technology platforms, where the introduction of a new technology such as 10Gb ethernet capability drives entirely new server platforms and architectures.

What Does Compatibility deliver?

Let us look at what long life architecture really means.

Reduced Risk

Even well thought out plans for introducing new technology can be turned upside down by unexpected issues. The more unknowns being introduced the higher the risk. With BladeCenter, the introduction of a

new processor, memory type, fabric, or I/O technology no longer means an entirely new IT architecture to test. BladeCenter, with its building block approach, allows customers to migrate to the latest and greatest technology without a great deal of difficulty. A perfect example would be moving to the latest processors. To implement the newest from Intel, AMD, or IBM only means a new blade; your power, thermals, systems management, switching all likely will stay the same. These are all unknowns with a new server or a new bladed architecture and testing them will cause unneeded 'churn' on the IT staff. An unknown as simple as "how is this going to fit into my rack" could put a complete hold on placing a new server into production. The continuity and compatibility provided by BladeCenter is sharply contrasted by our competitors' history of painful changes. If you want to introduce a new technology without overhauling the entire IT infrastructure, IBM BladeCenter is the right technology.

Testing and Investment

When a vendor changes architecture what happens to all the investment and testing clients have made in existing products? In these times of spiraling IT growth and a limited number of skilled IT professionals, the less 'retesting' you have to do the better. Why retest that Cisco or McDATA switch that is working just fine now? Uncontrolled change from your IT vendor can drive extra work onto your IT staffs who are likely spread thin with the current workload. The building block approach that BladeCenter uses enables seamless change and is a welcomed consistency in this world of change.

Customer Choice

How long does it take a company to develop an ecosystem of parts to work with their technology? The answer to that question varies, but it typically takes years to build the partnerships and products around the platform to deliver enough choice for customers to do what they need. IBM has been aggressively building their ecosystem since November 2002. Today we have literally hundreds of tested cards, fabrics, switches, operating systems, and solutions surrounding BladeCenter. On the day that BladeCenter H announced, the ecosystem surrounding it was complete and ready to support. This is not common for companies to be able to deliver the kind of advancement in technology that we delivered with BladeCenter H, while at the same time preserving the existing ecosystem. Other vendors that are going to change architectures will be forced to abandon all the products they have today and require their IT partners to redevelop everything for the new design- a task that will require extensive time and expense.

More Vendor Partnerships

IBM has opened up the technical specification for BladeCenter to their alliances. This means we are no longer the only company designing for the BladeCenter form factor and rooting for its success. Industry cooperation is critical for providing customer choice on a platform. Our partners need to be confident that their investment in developing these unique parts will not go to waste quickly due to a chassis or form-factor change. Companies designing products for BladeCenter can see the consistency over the past 3+ years and feel comfortable investing money in this platform.

Upgrade and Expand On Demand (No Matter When)

Today many of our clients are installing the chassis along with network and storage switching prior to filling the chassis up with processing blades. These clients are counting on IBM maintaining compatibility, so next year when they have a need for new technology it will be compatible with their existing platform. This is incredibly important to small and medium business customers that grow over time and are looking to benefit from the simplicity of blades without having to purchase everything now. For customers looking at other companies architectures that are not stable in the long term, there is little or no value in those unused blade bays? These customers will likely be forced to buy N-1 technology, and that is if they can even get it.

Recycling IT - Saving Time and Money

Imagine an IT design that lets you take blades out of your current chassis and seamlessly upgrade to the latest processing and storage technology without making rack level changes to power, cabling, cooling, etc. No need to imagine- we are doing that today with BladeCenter. Clients that deployed blades in 2002-2003 are finding those servers coming up for refresh. Normally, these customers would be facing a tough task- the installation of an entirely new solution. Because BladeCenter blades today work with the original chassis and switches, these customers have an alternative. Leave the rack, its fabrics and storage, cables, and power in tact and only replace the processing engines that drive the solution. With products like the HS20 ultra low power and the AMD Opteron LS20, IBM clients can increase

performance by nearly 3X without the pain and much of the time or cost of deploying a new IT infrastructure.

A Look at the Future

Our ability to deliver on this promise to seamlessly transition comes from the fact that we got it right the first time with our blade vision. We do not have a need to divert greatly from our original plans, which in turn means no painful tear ups for our architecture.. While most, if not all, other blade vendors in the market today are on their second or third attempt to design an infrastructure, BladeCenter is IBM's first and only architecture. The same thinking that led us to find ways to support full-performance enterprise level processors rather than laptop style processors, to reduce power consumption and heat generation, reduce cabling cost and complexity, increase system's management capabilities, increase the speed of installation and increase the scalability of BladeCenter, will continue as we move to the next generation of product offerings. Why change what is working so well?

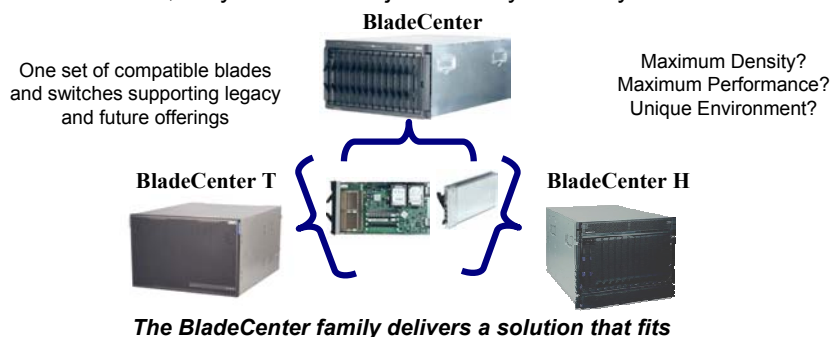
Where will technology be in 24 months? No one really knows, so we have continued to build into the BladeCenter platform flexibility that will allow us to accommodate regardless of the direction of the industry. So far, we have discussed our plans for compatibility. Rest assured, upcoming products continue to deliver on this promise of value. We have and will continue to deliver many new offerings as we move into the future. Let us take a quick look at each area of the portfolio to give you a better understanding of where we are heading.

Chassis

This is the area where the majority of our innovation will take place. After all, the chassis is the foundation on which companies are building their IT infrastructure. The next BladeCenter chassis, called BladeCenter H, includes many of the same design points as BladeCenter today. It includes support for all current legacy fabrics; it allows for powerful management via the new Advanced Management Module; it provides N+N redundant and hot-swap shared power and cooling for improved efficiency; and it accepts all current blades and switch modules. In addition to these features, BladeCenter H brings a new high speed InfiniBand[®] backplane that will allow us to deliver faster I/O performance for new technologies such as 4X Infiniband switching, and 10Gb Ethernet or 10Gb Fibre Channel. Keep in mind that BladeCenter H is not a replacement for the BladeCenter chassis, it is merely a higher performance member of the family, and it joins BladeCenter and BladeCenter T in providing our customers choice.

The new chassis will take virtualization to new levels and mark the next step for the adaptive On Demand business. Server and storage virtualization is not new, but BladeCenter H will take these ideas to the next level by allowing server, storage, and I/O virtualization across multiple chassis in a rack.

If you have current blades and wish to port them into a BladeCenter H chassis, they will be fully supported. The same holds true for your existing switches and fabrics. Because these same fabrics are supported in BladeCenter H, they will function just as they do today.



Blades

Along with new chassis will come new blade offerings from all of our current processor vendors, along with new processor engines that will further extend the reach of BladeCenter. Future blades will be optimized for use in BladeCenter H, but will also function in the current BladeCenter and BladeCenter T chassis. You may not get all the function in the older chassis that you would realize in the new BladeCenter H, but you will get similar function to that seen in current blades in the original BladeCenter.

This is ideal, because whether you are looking for both high performance bandwidth and the latest processor or just better processing performance, a single IBM blade will provide the needed function.

Switching

As mentioned above, all the fabrics available today in BC and BCT are supported in BladeCenter H. In addition to existing products, all new PCI-X based switch offerings released will be compatible with all three chassis. In addition to these trusted legacy fabrics, we will deliver new high-speed switching products. The first of these new high performance switches will be based on 4X InfiniBand, with more planned to arrive before the end of 2006. The fabrics and switch bays in BladeCenter H are designed to provide ultimate flexibility for supporting all high-speed protocols that may take shape- SAS, IB, 10GB Ethernet, 8/10Gb fibre channel, PCI-Express, and more.

Ecosystem

We are bringing a lot of new function into market with the next generation of product offerings, and we expect to see many of our 700+ partners who have signed up to receive the BladeCenter specification and joined Blade.org to continue working with us, to exploit these new capabilities and bring value to our clients.

Management Module

Some call it IT sprawl, others think computers are taking over the world. With the rate of IT growth at an all time high, it is becoming increasingly difficult to add the IT staff to keep up with this growth. The BladeCenter Management Module is designed to increase the control of IT staff members over all the components in a bladed environment. With the arrival of BladeCenter H, IBM is delivering a new management module that will take autonomic control to unseen levels. The new Advanced Management Module (AMM) was designed to autonomically respond to events that used to require human intervention. A perfect example is the AMM's ability to respond instantaneously to a power crisis, keeping all components in the chassis up and running. Built on a more robust hardware platform with more memory, a Linux OS, and support for more open standards (such as Apache and SMASH), the AMM will make it even easier to take control of the entire solution.

The Life of Current Offerings

BladeCenter and BladeCenter T have been the platform of choice for customers for several years. With a huge install base of these chassis in market, IBM is in no rush to see these platforms go end of life. Even after being in the market for years, they still contain all the function that the majority of our customers require. We plan to continue to sell and support these products going forward, and we see nothing that would prevent existing BladeCenter products from being in market until at least 2008. Our customers will let us know when things like 1Gb Ethernet and 4Gb fibre channel are no longer of value and it is at that point when BladeCenter, the original work horse of the product line, will go end of life.

To illustrate our commitment to the long-term support of BladeCenter, IBM is taking steps to allow many current offerings to live past a critical milestone that occurs later this year. That milestone is commonly known as RoHS (pronounced RO-hoss), for Reduction of Hazardous Substances. It is a mandate that affects many countries all over the world. It states that all IT equipment imported into a RoHS country must be RoHS-compliant after July 2006. RoHS-listed materials include lead, mercury and cadmium, among others. IBM has announced RoHS versions of BladeCenter and BladeCenter T along with RoHS versions of all the current blades.

The primary focus of this paper has been on BladeCenter and its planned changes. However, BladeCenter T also has plans to deliver BladeCenter H-style functionality in the future (to be determined). We expect the BladeCenter T follow-on product to carry forward the same type of investment protection and future-proofing as BladeCenter H. Based on the same form factors and switch fabrics, the BladeCenter T will continue to deliver industry leading functionality with out tearing up the original tenants of our BladeCenter plans.

Summary

There is a lot going on all around us in IT today. Some of the changes are problematic, but most are exciting and welcomed. IBM BladeCenter will continue to adapt and transform to meet the needs of our clients, without the need to remove existing platforms that have been in place for years. In 2005, we celebrated the three year anniversary of the release of BladeCenter, and throughout 2005 the product continued to garner several key awards and accolades such as XXXX. As history can attest, 2006 will be a year in which we will help our clients to make the right choices for their current and future IT needs. Be confident that the BladeCenter team is committed to maintaining the same leadership thinking and design that has made it number one in the marketplace for two and a half years.

The questions to ask the competition

(1) How many previous changes has the other vendor made since delivering their blade offering?

HP has seen two generations come and go and is on their third generation of blades with the BL pClass offering. Our customers are telling us that this platform is about to be replaced by a new HP blade designed call the cClass. The new infrastructure shares nothing in common with the pClass- blades, switches, even power that clients have tested today will need to be replaced to move to the new design. This will cause a lot of painful testing and work load on an already over burdened IT staff.

IBM is on the same architecture we started with in November 2002 - constantly adding to the ecosystem of compatible parts and solutions to deliver the most complete blade offering available.

(2) As the competitor moves to their new infrastructure how long will it take them to build an ecosystem of blades, switches, and solutions to make the new platform valuable?

It takes time and a lot of energy to bring together a 'solution'. Blades are all about solutions. The ability to bring it all together into a unified platform means you can not deliver only bits and pieces. Will the new architecture have the networking, storage, processor, OS, and software options you need? It is highly unlikely until the vendor has time to build the ecosystem. In the mean time you are unlikely to find everything you need to run your unique applications.

(2) How much retesting and pain will a complete architecture change force on your IT staff?

The question here is about cost, time, and risk because every time you bring in something new there are many unknowns that could cause problems as the solution goes into a production environment. If you are happy with your currently deployed switches, blades, or software solutions why should poor planning on your vendor's part force extra work, cost, and risk onto you.

Additional Information

For more information on IBM BladeCenter products, services, and directions please visit our Web sites at:

- <http://ibm.com/servers/bladecenter> for more on all of the **BladeCenter chassis, blade servers, modules** and options
- <http://ibm.com/servers/eserver/clusters> for information about @server **1350 clusters** using IBM blade servers

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