

White Paper

Converged Data Center Solutions

**Brocade and Hitachi Data Systems Join Forces to Automate
and Accelerate Cloud Adoption**

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Change is Constant

IT organizations continually transform to meet shifting business needs. If a new product is launched, IT is asked to change course; if there is an economic downturn, IT is asked to cut costs; and when government regulations change, IT is charged with improving compliance. Whether the reason behind the shift is competitive, technological, economic, or regulatory, IT must change constantly.

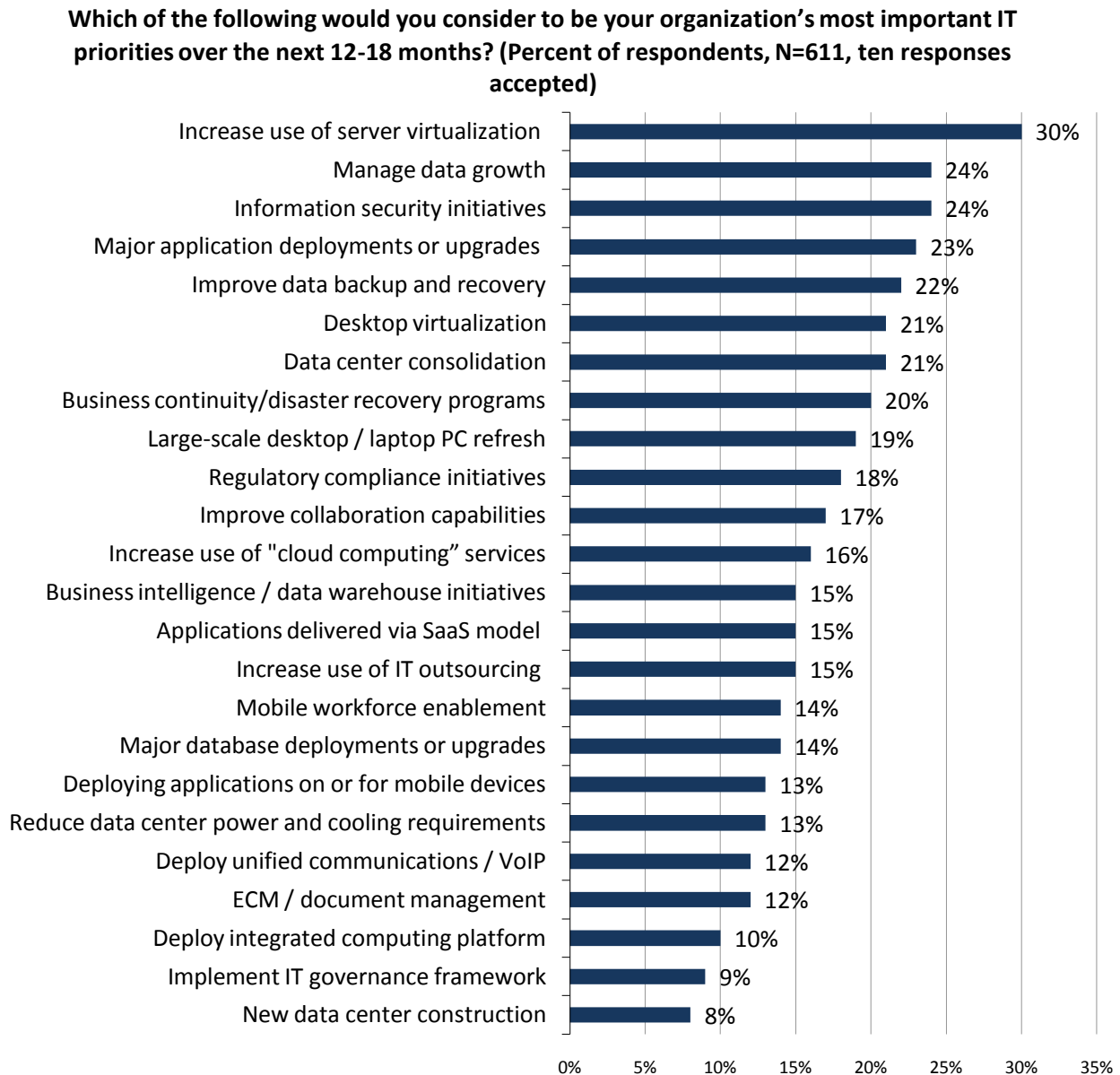
Recent transformations have come about in response to emerging data center strategies, technologies, and architectures. For example:

- *Virtualization* technologies are reinventing IT tasks and roles. The virtualization of compute, network, and storage resources into distributable pools allows IT to operate with greater efficiency; consolidated workloads can also help an organization improve performance and provide the flexibility to meet the demands of today's hyper-competitive, continually changing business environment. IT can more quickly bring new applications online and respond to user needs. This has resulted in greater appreciation of IT services by users and greater expectations of what IT can provide.
- *Converged infrastructures* are a new deployment method. Pre-integrated bundles of server, network, storage, and application resources are delivered as individual units with consolidated management and automation. These units are designed to be easy to purchase and deploy, and to increase utilization rates while reducing costs.
- *Cloud computing*. Cloud computing, IT-as-a-service, and service-oriented architecture models are enabling IT to offer infrastructure services to business units on a pay-as-you-go basis. In fact, in ESG's *2011 IT Spending Intentions Survey*, cloud- and service-oriented computing models made the largest moves up the IT priority list, as Figure 1 shows. Out of 24 items, the increased use of cloud computing services climbed from 22nd place in 2010 to 12th in 2011. Similarly, software-as-a-service rose from last place in 2010 to 14th in 2011.¹

Organizations are now discovering a need for more open, agile cloud architectures. The fluid design of virtualized, cloud infrastructures can be hindered when proprietary components are required. The purpose of virtualization is to separate the actual hardware devices from the services they provide; therefore, the server, network, or storage choices made today should not restrict choices in the future. [Hitachi Data Systems](#) and [Brocade](#) have brought to market open, flexible solutions for converged computing with this in mind. Brocade refers to its solution as Virtual Compute Blocks (VCB) while Hitachi offers converged data center solutions.

¹ Source: ESG Research Report, [2011 IT Spending Intentions Survey](#), January 2011.

Figure 1. Most Important IT Priorities for 2011



Source: Enterprise Strategy Group, 2011.

Data Center Transformation

To add business value, data centers must transform. Respondents to ESG research surveys have indicated that the most important factors for justifying IT investments to business management teams are improving business processes, reducing operational costs, speeding return on investment, and mitigating risk—these are the results with which data centers must align. In annual surveys conducted in 2009, 2010, and 2011, reducing operational costs has remained the top priority (see Figure 2). However, while 62% of respondents cited reduced OPEX in 2009, that number dropped to 54% a year later and then dropped again to 43% in 2011. Simultaneously, business process improvement, return on investment, and improved security/risk management have increased.²

² Ibid.

Figure 2. Most Important Considerations for Justifying IT Investments, 2009 vs. 2010 vs. 2011



Source: Enterprise Strategy Group, 2011.

In order to provide a flexible environment that meets business requirements, several factors must be part of today's data center plans.

- First, IT needs an *application focus* rather than a device focus. A static infrastructure with dispersed islands of dedicated resources is an operational and managerial nightmare. It is expensive, makes it difficult to maintain consistent practices, and requires more management staff. IT managers should be looking at the type of environment needed for each application. Some business critical applications may need a higher level of availability or performance while others may operate well with slower performance and occasional downtime. Resources should be cost-effectively distributed and tightly aligned with business priorities. Making explicit, configurable, and operational relationships between infrastructure resources and applications brings IT closer to the core mission of the organization. It allows IT to operate with a service catalog approach, allowing the business to select resource levels by feature and cost, matched to business requirements.
- At the same time, data centers need to be *agile* to respond quickly to changing strategies, priorities, and technologies. For example, if it takes six weeks to procure and provision additional storage for an application, the business may miss a market opportunity. Instead, business managers want to be able to spin up infrastructure resources as needed to support long- and short-term projects. Similarly, IT should be able to take back unused resources and redeploy them. This type of flexibility is not only important for keeping up with project needs, it is critical to maintain efficiency. Only with IT resources operating near their full potential can costs be contained effectively. Hardware resources are too expensive to be used in silos, utilizing only 20% of their capacity. At the same time, businesses cannot afford downtime and performance problems that result from a lack of resources in one area while capacity goes unused in another.
- Rapid scalability* is key. Consolidated resource pools can make it easier and faster to scale and add new virtual machines. IT can allocate power, bandwidth, and storage capacity on an as-needed basis while

minimizing the amount of hardware that must be purchased, managed, maintained, powered, and cooled. Aggregating workloads on physical servers means increased throughput and IO, so the infrastructure must be prepared to deliver it without bottlenecks. Scalability of network resources is sometimes neglected at the expense of performance and availability.

- *Simple solutions* reduce complexity, improve operations, and save money. As virtualization progresses, the lines between infrastructure domains are blurring. IT administrators require greater visibility across the infrastructure stack in order to effectively manage and troubleshoot; they must be able to see horizontally from the business/application perspective instead of vertically by server, network, or storage domain. Automation, consolidated management, and integrated tools for managing configuration, workflow, data protection, and SLAs simplify management and enable service-oriented IT.

All of these features help to *facilitate cloud-based deployments*. Extended virtualization is required to de-couple infrastructure resources from specific hardware. The emergence of new infrastructure building blocks made up of open and flexible converged infrastructure packages can streamline the transition from the traditional, static, device-focused data center to one delivering cloud-based infrastructure services.

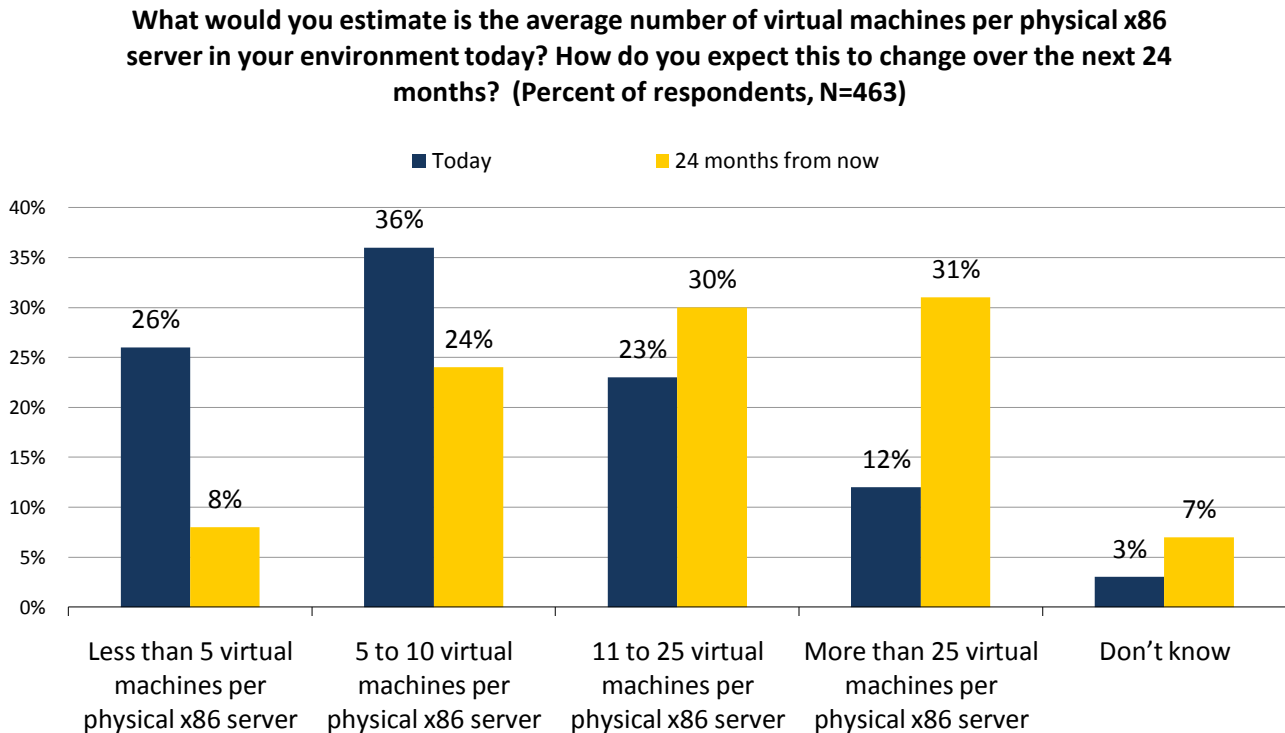
Converged Infrastructure Enables Cloud Computing

As mentioned, cloud computing requires an application-centric, agile, scalable, open architecture that minimizes complexity and is weighted toward business drivers. Converged infrastructures are a new building block designed to accommodate these needs. Converged infrastructures provide an organization with these features:

- *Extended virtualization benefits.* Most data centers today include a mix of virtual and physical servers, storage arrays, and networks. Converged solutions can provide better visibility and a deeper understanding of the business impact of data center operations. Convergence can provide the level of information needed to make intelligent decisions about where virtualization and consolidation can have the biggest impact, accelerating modernization and compressing time to ROI.
- *Rapid deployment.* Preconfigured and tested solutions are faster to install with lower risk. Whether you're building a new data center or extending an existing one, heterogeneous architectures require extensive time and effort for procurement, testing, and integrating into the environment as well as troubleshooting and tuning once it's deployed. With a converged infrastructure, the risks and costs are reduced—the vendor does the work up front so the user doesn't have to. An effective converged infrastructure should be able to accommodate heterogeneous devices and architectures to provide customers with maximum flexibility. Converged solutions also simplify ordering, enabling IT to respond quickly to new requests.
- *Application-solution focus.* Pre-tested configurations built for specific applications can dramatically reduce integration and tuning time. Use cases have been validated for applications such as e-mail, virtual desktop infrastructure (VDI), collaboration applications, and other common business applications.
- *Centralized and simplified management.* Converged solutions bring management tools together to cover all components with end-to-end visibility across the stack. An orchestration layer is designed to automate and coordinate various cross-domain functions, using feedback from monitoring tools, to keep the unit operating properly and delivering services as defined. This is especially important to support the "growth spurts" that accompany rapidly scalable virtual environments.
- *High-performance connectivity.* Converged units need high performance connectivity to ensure that they can handle today's network traffic. Virtualization aggregates workloads, increasing throughput and IO; high performance connectivity can handle aggregation and prevent bottlenecks. Workload mobility can also cause unexpected network congestion and shifting traffic patterns make it difficult to understand and regulate fabric behavior. Highly virtualized environments are also driving new bandwidth requirements as VM density increases. According to ESG server virtualization research conducted in the fall of 2010, IT organizations expect to significantly increase the number of virtual machines per physical server. At that

time, 62% of respondents had 10 or fewer virtual machines per physical server, but almost one-third expected to host at least 25 VMs per server within 24 months (see Figure 3).³

Figure 3. Average Number of Virtual Machines per x86 Server



Source: Enterprise Strategy Group, 2011.

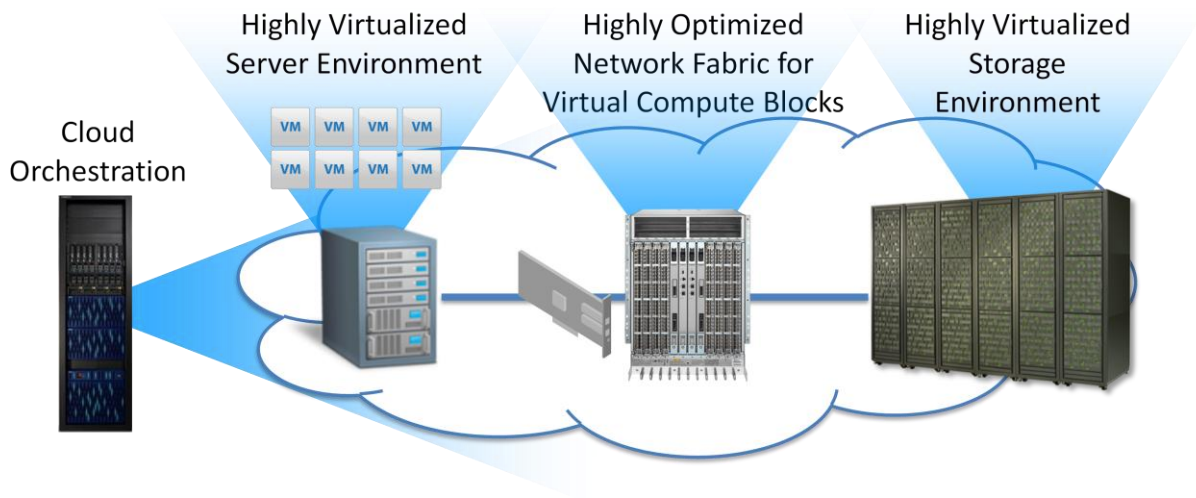
Hitachi and Brocade Converged Data Center Solutions

The combination of Brocade® Virtual Compute Block (VCB) technology and Hitachi converged data center solutions deliver an accelerated path to cloud computing. Brocade VCB technology is based on cloud-optimized networking and is designed to meet the four customer imperatives of the Brocade One™ Strategy. These imperatives include unmatched simplicity through streamlined architectures and reduced costs; non-stop networking environments that have new levels of scalability, uptime, and performance; optimization for current and future applications; and investment protection by delivering best in class solutions for an open, multivendor architecture. Brocade qualifies virtual server and storage resources to work with its adapter, switch, and backbone families. Hitachi delivers prepackaged converged solutions that have been tested for specific hypervisors or applications. These integrated solutions leverage Hitachi Compute Blade systems and Hitachi storage resources, but use industry standard network devices. Hitachi also offers a Unified Compute Platform management rack capable of creating a cloud platform from Hitachi compute and storage with best of breed networking or by utilizing existing server, network, or storage components.

These pre-packaged and pretested solutions help organizations take advantage of new technologies quickly. While both Hitachi and Brocade adhere to a mantra of open and flexible, Figure 4 is an example of how combining these two open cloud solutions can deliver a complete and flexible data center cloud solution. In fact, the technology partnership does not end at combining platforms for converged solutions, Hitachi integrates Brocade networking technologies in its converged data center solutions, including the UCP management rack, to enable efficient communication with other devices. The diagram illustrates how an open cloud solution could be built using Hitachi UCP management rack controlling Hitachi x86 servers enabled by Brocade adapters and fabric switches and Hitachi VSP storage.

³ Source: ESG Research Report, [The Evolution of Server Virtualization](#), November 2010.

Figure 4. Example of an HDS and Brocade Open Cloud Solution



Qualified Solution Components			
Orchestration	Servers	Networking	Storage
Hitachi Unified Compute Platform Management Rack	x86 Servers with Win 2008 R2 w/HyperV	Brocade Backbones, Switches Adapters & Brocade Network Advisor	Hitachi VSP and any Other Industry Standard Storage under the VSP
	Hitachi Compute Blade 2000	Industry Standard Network	

Source: Enterprise Strategy Group, 2011.

With the combination of Hitachi UCP and Brocade networking solutions, users can create new cloud-based deployments or simply build on current infrastructure without the guesswork and troubleshooting. Given the open architecture of Hitachi Unified Compute Platform, customers can use Hitachi or non-Hitachi storage infrastructure using Hitachi Virtual Storage Platform (VSP), Hitachi Compute Blade systems or any common x86 servers (with MS Windows Server 2008 R2 with Hyper-V), and any common network components. Multi-tenant environments with access to multiple tiers or resource pools are supported, so UCP can support multiple applications, workloads, or departmental applications in the cloud. Management of servers, networks, and storage is orchestrated from the UCP management rack, which arrives pre-integrated with Brocade Ethernet and Fibre Channel switches and ready to bring resources on board. Simplifying integration and ongoing management reduces CAPEX and OPEX even while the scope and scale increase.

In this example, a Brocade 1860 Fabric Adapter was added to the Hitachi servers, which replaces individual HBAs, CNAs, and NICs. Because it supports 16 Gbps Fibre Channel as well as DCB, TCP/IP, iSCSI, and FCoE, the Brocade 1860 enables customers to leverage their existing networks with no limitations. Brocade Network Advisor unifies connectivity management and provides visibility into the virtual server domain; because it is integrated with third-party frameworks, customers can continue to manage without wholesale change. Of special value is the extension of Brocade fabric services to servers and applications to maximize network performance and reliability. The Brocade DCX® 8510 backbone provides the reliable, scalable, high-performance Fibre Channel switching foundation. Like the other components of this solution, it protects existing investments while increasing business agility and reducing both CAPEX and OPEX. It offers simple scale-out design, optimal connectivity over distance, easy deployment, and centralized management.

Together, all these components create a flexible and scalable cloud environment. The sooner organizations take the cloud plunge, the more value they gain as they quickly add new and mission-critical workloads to it.

Hitachi and Brocade Components for a Complete Solution

As described, private cloud data centers offer virtualized pools of compute, storage, and network resources; on-demand, rapid application provisioning; lower capital and operational costs; higher asset utilization; and automated management orchestration. This sounds great! But not if you have to design and build it yourself or get locked into proprietary solutions. Industry leaders Hitachi and Brocade can deliver open and flexible converged infrastructure solutions to help build a flexible cloud environment. The Brocade VCB architecture provides cloud-optimized networks (including a new class of fabric adapter and a scale-out backbone) as well as unified management. Hitachi converged data center solutions include hypervisor-based solutions, application focused converged platforms (Microsoft Exchange) based on Hitachi Compute Blade systems and storage, and Unified Compute Platform that can be used with a combination of Hitachi and industry standard infrastructure solutions.

Brocade Virtual Compute Block Solutions

Brocade VCB solutions are pre-configured and tested to simplify and accelerate the deployment of cloud computing, providing maximum deployment flexibility with plug-in scalability. The VCB architecture is designed to help Brocade partners create open and flexible server virtualization environments in which information and applications can reside anywhere. Its hallmarks are faster time from order to deployment using pre-configured and tested solutions. A VCB leverages a fabric-based network providing improved performance, resilience, scalability and lossless transport. VCB development starts with a server virtualization reference architecture jointly defined by the partners, in this case Hitachi, Microsoft, and Brocade. This is then tested and validated using best practices from all the partners. The reference architecture provides customers an easy to follow guide for building their own virtualization configuration reducing risk, cost, and time to deployment.

Enabling Cloud Computing

These solutions enable cloud computing by consolidating IO, making server connectivity much simpler. Brocade's goal is to provide cloud-optimized networks. Brocade 1860 Fabric Adapters provide a virtual IO layer and application-aware fabric services as well as unified management, self-service, and automation. These features enable IT to provide a pool of resources in a service-oriented manner to support applications instead of assigning individual paths and devices. The Brocade 6510 Switch and Brocade DCX 8510 Backbone provide hyper-scalable fabrics, simple operations and management, and cloud-optimized performance. These enable Brocade to provide a foundation for a computing environment that supports multi-tenancy, is driven by application-focused SLAs, supports end-to-end management, and delivers dynamic services such as extension, encryption, and convergence. Core components include:

Brocade DCX 8510 Backbone and Brocade 6510 Switch

The Brocade DCX 8510 is part of a family of data center-proven Brocade backbones designed for scalability, performance, and reliability—all critical for cloud computing and IT-as-a service. Simplifying scale-out network design and optimizing distance connectivity, the Brocade DCX 8510 is easy to deploy and manage. It offers maximum application and storage performance while protecting SAN fabric investments. The Brocade 6510 Switch meets the demands of hyper-scale, private cloud storage environments by delivering market-leading 16 Gbps Fibre Channel technology and capabilities that support highly virtualized environments. It also provides a simplified deployment process and a point-and-click user interface, making it both powerful and easy to use. The Brocade 6510 offers low-cost access to industry-leading SAN technology while providing “pay-as-you-grow” scalability to meet the needs of an evolving storage environment. Innovative backbone and switch features include:

- **Scale out capability.** Brocade DCX 8510 supports over 3000 8 Gbps ports or 2300 16 Gbps ports, with no inter-switch links. It delivers nearly 50 TB per second of aggregate bandwidth and six domains. The Brocade DCX 8510 employs Inter Chassis Links, or ICLs. Each ICL port is capable of delivering 64 Gbps of bandwidth and can connect up to six chassis. With up to 32 ICL ports per Brocade DCX 8510-8 chassis, it can deliver up to 2 Tbps of ICL bandwidth. The Brocade 6510 is configurable in 24, 36, or 48 ports and supports 2, 4, 8, 10,

or 16 Gbps speeds in an efficiently designed 1U package. The 48 ports produce an aggregate 768 Gbps full-duplex throughput; any eight ports can be trunked for 128 Gbps Inter-Switch Links (ISLs).

- **Dynamic fabric provisioning.** This enables the Brocade DCX 8510 to adapt easily to change without disruption, eliminating fabric reconfiguration when adding or replacing servers—including the need to modify zoning and LUN masking—and allows customers to pre-provision fabric ports with virtual WWNs.
- **Multi-tenancy.** The Brocade 6510 provides a critical building block for today's highly virtualized, private cloud storage environments by providing multi-tenancy through virtual fabrics, quality of service (QoS), and fabric-based zoning features.
- **Diagnostic Port capabilities for ISLs.** New D Ports enable customers to verify transceivers and cables ensuring fabric link level integrity and accurate buffer credit assignment. This capability should reduce fabric deployment and diagnostic times to hours instead of days.
- **Encryption and in-flight compression, metro, and global connectivity.** Both the Brocade 6510 and Brocade DCX 8510 offer impressive data transport capabilities—performing both security and optimization techniques at wire speeds for inter-switch links (ISLs). They are also both capable of connecting directly to DWDM or 10GbE IP WAN links.

The number one impact of server virtualization on networking technologies is that it has created more network traffic in the data center.⁴ Virtualized and cloud-based environments, with their IO-intensive applications and aggregated workloads, require the high levels of scalability, performance, and reliability that the Brocade DCX 8510 and Brocade 6510 Switch provide.

Brocade 1860 Fabric Adapter

Designed for demanding virtualized environments, the Brocade 1860 meets the connectivity needs of cloud-enabled data centers with high-performance, application-aware services, unified management, and lower cost and complexity. Some of its more innovative features include:

- **Brocade AnyIO technology.** Capable of simultaneously running 16 Gbps Fibre Channel and 10 GB data center bridging (DCB) connectivity for TCP/IP, iSCSI, and Fibre Channel over Ethernet (FCoE), this replaces individual FC HBAs, 10 GbE converged network adapters (CNA), and network interface cards (NIC). It is optimized for both bandwidth-intensive applications (e.g., backup, video editing, vMotion) and IOPS-intensive applications (e.g., e-mail databases, OLTP).
- **Virtual Fabric Link (vFLink) IO virtualization.** This enables organizations to drive greater IO consolidation with tighter control, mapping up to 8 vFLinks per adapter. This means up to 4 PCIe Physical Functions (PFs) per port for Fibre Channel (vHBA⁵) or Ethernet (vNIC or vHBA FCoE). Configurable in increments of 100 Mbps, these virtual fabric links appear as independent physical adapter to the operating system and as such they are agnostic to the OS, hypervisor, and access layer switch, enabling an open and flexible environment.
- **Brocade Server Application Optimization (SAO) technology.** This lets the Brocade 1860 extend the intelligence and advanced services of Brocade FC fabrics to servers as well. With N_Port Trunking, two 16 Gbps links can be combined into a single logical 32 Gbps connection, with frame-level load-balancing for high performance and fault tolerance. In addition, quality of service (QoS) is extended from the fabric to the VM and application levels. QoS ensures that mission-critical workloads are not impacted by network congestion or device anomalies, ensuring that application SLAs are met.
- **Virtual Machine Optimized Ports or VMOP.** By performing layer 2 classifying and sorting based on MAC and VLAN tagging, Brocade can map VMs to specific cores and enable 10 GbE line-rate performance

⁴ Ibid.

⁵ Multiple vHBA support available in future driver release.

without manual configuring. This currently is supported with the use of VMware NetQueue or Microsoft VMQ.

The Brocade 1860 eases the transition to private clouds by simplifying and optimizing IO in virtualized environments. The benefits of maximum bandwidth utilization, frame-level load balancing, and transparent failover across physical links provide the performance and reliability that cloud environments need; its ability to support multiple protocols and workloads help build a flexible, multi-purpose cloud infrastructure.

Unified Management

Brocade Network Advisor simplifies management by unifying and automating adapter, SAN, and LAN management. Users can monitor and manage adapters across the data center, including performance, diagnostics, event management, and BIOS/driver upgrades for both individual adapters and groups. Wizard-based configuration, integrated diagnostics, monitoring, and change management simplify virtual fabric management. In addition, organizations have deep virtual machine visibility in VMware ESX environments for hosts running Brocade server adapters. It provides end-to-end, VM-to-LUN path information for all VMs per server. Brocade Network Advisor offers an open architecture with industry-standard APIs for seamless integration with various hypervisors and third-party orchestration frameworks (including those from IBM, EMC, HP, VMware, and Microsoft), security partners, and service delivery platforms. It brings server, storage, and network monitoring and service orchestration products together for consolidated management to make IT's job easier.

Hitachi Converged Data Center Solutions

Hitachi has recently announced new converged data center solutions designed to automate, simplify, and accelerate the adoption of cloud computing. The company's objective is to provide solutions that enable faster deployment, automation, and scalability to help organizations adopt cloud infrastructures at a pace that works for them, with predictable results and faster time to value. These converged solutions help eliminate some of the roadblocks to private cloud deployments that come from a lack of infrastructure standards, expertise, and best practices. The Hitachi vision includes four levels of solutions:

- Level 1: Reference architectures - designed for key applications such as Microsoft Exchange and Oracle as well as virtualized environments such as Microsoft Hyper-V Cloud and VMware.
- Level 2: Hardware integration - solution-specific, validated bundles of integrated hardware platforms.
- Level 3: Management integration - orchestrating various components across the boundaries of technology domains.
- Level 4: Services integration - to enable organizations to offer self-service IT with orchestration across multiple data centers.

Hitachi has two solutions for the Level 1 Microsoft Hyper-V Cloud Fast Track and one each for Level 2 and Level 3. The solutions referred to in Level 1 are called **Hitachi solutions built on Microsoft Hyper-V Cloud Fast Track**. Designed for rapid deployment to quickly address current needs, these are single source, pre-validated configurations that include Hitachi Compute Blade systems (with internal Brocade networking) and Hitachi storage (AMS or VSP). They are intentionally easy to order and deploy, accompanied by guides and reference architectures. They help organizations create building blocks, ensuring predictable reliability and performance as they build scalable, multi-tenant, multi-tiered cloud environments. These solutions leverage Microsoft System Center and can support from 200 to over 500 virtual machines (AMS) or from 450 to over 1300 virtual machines (VSP). This first solution provides an avenue for further automation with a path to Hitachi Unified Compute Platform (UCP) and its orchestration.

At Level 2 is **Hitachi Converged Platform for Microsoft Exchange 2010**. This is the first application-focused solution, and uses Hitachi Compute Blade systems and Hitachi storage devices (AMS) with industry standard Brocade networking. It provides the simplicity, reliability, and scalability that cloud-based solutions require. A single SKU makes it easy to purchase, and the pre-packaged bundle along with Hitachi service and support make it easy to

deploy and own. Reliability and high availability are delivered with a blade server N +1 cold standby deployment. Full-duplex storage with RAID protection, site resilience, and Mailbox Availability Groups (DAGs) are included. It scales in 8K mailbox increments and supports up to 96,000 mailboxes. The single converged unit provides all the resources necessary to deploy a Microsoft Exchange environment including built-in, enterprise-level reliability, availability, and scalability.

The first Hitachi solution at Level 3 is **Hitachi Unified Compute Platform**. Designed from the business requirements down, it unifies compute, storage, network, and software resources into a single platform. No dedicated storage array is required, making it more flexible than other solutions. UCP is a highly secure environment with flexible multi-tenancy that can be used with multiple resource tiers. For example, if accounting, finance, and research departments need different levels of infrastructure services, most organizations provide individual stacks of different servers, storage arrays, and SAN protocols. With Hitachi UCP, all three departments can securely reside in the same cloud infrastructure with comprehensive, automated management and orchestration. The UCP management rack is the key component which enables the infrastructure to be organized and orchestrated as a private cloud. The UCP management rack utilizes best of breed products such as Hitachi blade servers, Hitachi storage, and a Brocade 10Gb Ethernet switch, all utilized by the UCP Management Software to onboard and orchestrate the infrastructure as a cloud. This combination of best-of-breed products addresses the challenges customers face in implanting virtualization and cloud computing infrastructures.

This truly launches the data center transformation required for cloud enablement. Resources can be managed across the infrastructure as collective, cloud-based services. UCP retains the value of current infrastructure resources and simplifies both deployment and operations. This is an effective way to take advantage of the resources currently in-house and still build a cloud deployment. Hitachi UCP is a good “on-ramp” to the cloud. These platforms are enabled by the foundational Hitachi Virtual Storage Platform and Compute Blade technology.

Hitachi Virtual Storage Platform (VSP)

Hitachi VSP utilizes a storage management architecture that is ideal for open and flexible cloud computing. It is capable of working with all storage platforms and data types. By leveraging an integrated approach, HDS can apply a common set of management tools across all storage assets, regardless of manufacturer. This common platform and management drives greater overall efficiency of storage environments by enabling better utilization, cost management (power and cooling), chargeback, management operations, and data protection. Specifically, this platform includes:

- **One platform to manage all data.** This includes all block, file, and digital content. Virtualization capabilities allow for heterogeneous support and the ability to rapidly integrate or refresh systems. It also enables tiered storage management for improved performance and optimal storage placement for greater cost efficiencies.
- **Scalability in multiple dimensions.** VSP allows users to scale up performance in both mainframe and open systems environments. It can rapidly scale out to accommodate virtual server environments and storage capacity. Finally it is capable of scaling deep, providing support for multi-vendor storage environments.
- **Multi-tenant segregation support for cloud deployments.** This includes host port segregation, secure administrative domains, and advanced security with encryption capabilities. Additionally, VSP provides business views for provisioning, migration, replication, and reporting.
- **Orchestration and “openness” for Unified Compute Platform.** VSP virtualization capabilities enable UCP to manage third-party arrays and deliver intelligent tiered storage, including the orchestration across storage, server, and data networking components.
- **Service Level Management and Reporting.** A key component to cloud computing is the ability to more tightly align IT to the business. By providing policy-based service level management, organizations can ensure compliance with business requirements. This includes the ability to discover hypervisors and report on them.

By leveraging these cloud enabling capabilities, organizations are able to apply the appropriate delivery mechanisms and deployment methodology on top of the Virtual Storage Platform to facilitate and optimize cloud deployments.

Hitachi Compute Blade

Hitachi Compute Blade servers are an effective environment for consolidation. They cut cost, complexity, risk and compromise in your enterprise data center or your branch offices.

Compute Blade 2000 takes enterprise-class blade computing to a whole new level. It's powered by Intel Series processors and built on a balanced system architecture that combines massive throughput, Hitachi embedded logical partitioning (LPARS) virtualization and unprecedented configuration flexibility. This 10U, 8-blade system is ideally built for the most IO-intensive application workloads and virtualization and data center strategies.

With these converged data center solutions, Hitachi is striving to simplify the process of moving business critical workloads to the cloud. By providing enterprise-class components stacked together and preconfigured, Hitachi offers some predictable results to take away the confusion and risk of initiating cloud-based services. Built-in automation, templates, and reference architectures are there to make it easier. The automation of complex tasks also allows an organization to achieve the rapid resource provisioning that virtual infrastructure offers with the assurance that bundled components are in place and operating effectively. When IT must build virtual environments themselves, there is no such assurance. If things don't go well, it can lead to frustration and resistance to virtualization and clouds on the part of business application owners. Ease of ordering as well as implementation, an initial focus on common environments and applications, and the ability to start small and grow over time make Hitachi converged data center solutions customer-friendly.

The Bigger Truth

Business and technology changes feed on each other. Virtualization has re-invented server, storage, and networking domains into consolidated resource pools that can be provisioned quickly. As a result, business managers expect instant resource availability and are beginning to launch projects based on that assumption. The result is a continual game of leapfrog as organizations try to incorporate new technologies, keep up with business demands, maintain performance and availability, and operate cost efficiently.

New computing models are needed to address this reality. Converged computing solutions are a good option: tightly integrated infrastructure components bundled for easy ordering, deployment, and management with visibility across server, network, storage, and application domains. Individually, server virtualization, consolidated storage pools, and virtual fabrics all demonstrate how virtualization can lower costs and grow quickly. The natural evolution is to take these virtualized domains and combine them into a comprehensive solution via tightly integrated, yet open, virtual stacks instead of discrete domains that IT must glue together.

Cloud computing enables IT to deliver utility-like services to meet application needs without dedicating specific hardware to each application. Converged computing solutions built with virtualization can speed an organization's movement into cloud computing by simplifying tasks and providing assurance that the whole thing will work.

Hitachi and Brocade have developed open and flexible solutions to meet these needs. Brocade Virtual Compute Block (VCB) solutions enabled by the Brocade 1860 Fabric Adapter bring faster, unified fabric resources with advanced trunking and QoS while the Brocade 6510 Switch and Brocade DCX 8510 Backbone deliver robust switching designed for high performance, availability, and scalability. Brocade Network Advisor offers unified, automated SAN, LAN, and adapter management with visibility into the virtual stack and integration with various hypervisors and third-party frameworks. All of which can be used to build open, flexible building blocks customers can use to scale up and scale out their virtualization environments quickly. Hitachi has developed converged data center solutions, starting with the Hitachi solutions built on Microsoft Hyper-V Cloud Fast Track (an easy on-ramp configuration), Hitachi Converged Platform for Microsoft Exchange 2010 (simplifying deployment of cloud-based Exchange), and the Hitachi Unified Compute Platform management rack (for an open, secure, multi-tenant, multi-tiered environment).

The Hitachi and Brocade solution provides an example of how two open and flexible architectures can be combined to create a converged compute solution. All in all, these two companies have worked hard to help customers make the transition at their own pace without wasting current resources. Innovative architectures are not easy to incorporate, but both Hitachi Data Systems and Brocade demonstrate a clear commitment to developing open solutions to get customers where they want to go as quickly and easily as possible.



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