

INNOVATION ECONOMICS FLEXIBILITY INNOVATE RELIABLE TRUSTED
CHANGE INTELLIGENT TECHNOLOGY SERVICES VALUE INSIGHT
INFRASTRUCTURE INTEGRATE ANALYZE DISCOVER COMPETITIVE

Hitachi Unified Storage VM All Flash System and Brocade Gen 5 Fibre Channel SAN

Improved Speed, Efficiency and Economics for Your Data Center

Today's marketplace demands that businesses move faster and faster, with no signs of respite. As a result, bringing speed and efficiency to the data center is an imperative, rather than an option. Businesses need to harness the overwhelming quantities of data flooding their systems and turn that information into insight and innovation. Whether the data is structured or unstructured, traveling to and from applications, various mobile devices, the cloud, or other sources, IT must support, move, and store it all. And they must do so economically, as IT budgets and staff rarely increase to meet new challenges.

For many businesses, shifting to an all-flash storage solution brings the performance, efficiency and economics to maximize IT. By using only solid-state storage rather than hard disk drives (HDD) as media, all-flash storage systems enable competitive advantage. They speed data-intensive application response times, allowing more transactions in less time and enabling improved customer service, all while reducing costs.

However, all-flash storage cannot deliver on its promises of boosting speed and efficiencies without networking excellence. Critical workloads, high-density virtualization and cloud-based architectures are heavily taxing current infrastructures. In addition to reliable and speedy storage, the network infrastructure must be rapid and robust to handle heightened bandwidth and lower latency demands. Fibre Channel SAN fabrics provide the networking foundation that answers these requirements.

Hitachi and Brocade bring essential storage and fabric networking improvements that today's businesses need. This document pays specific attention to all-flash storage with Fibre Channel solutions. Hitachi Unified Storage VM (HUS VM) all flash system is designed to accelerate performance of business applications. Brocade Gen 5 Fibre Channel, the latest

SOLUTION PROFILE

evolution in storage area network (SAN) technology, combines low latency and high performance to maximize IOPS with flash storage while delivering unprecedented scalability and reliability. Together, Hitachi and Brocade provide no-compromise performance and data center efficiencies.

Hitachi Unified Storage VM All Flash System: Maximize Performance, Reduce Storage Costs

With integrated Hitachi Accelerated Flash and enterprise storage virtualization, HUS VM delivers faster access to information and increased efficiency through central management of all storage assets. Database, analytics, virtual desktop and virtualized server environments benefit from superior performance and improved response times.

Flash options have been provided to the data center over the past few years, but many are islands of technology that come at a steep price. IT organizations have been forced to make tradeoffs in performance, capacity and functionality to reach the cost points that their shrinking budgets can accommodate. HUS VM all flash system, which incorporates Hitachi Accelerated Flash technology, fundamentally changes this model by eliminating these tradeoffs and answering demands for high capacity, performance and advanced functionality with increased durability.

For enterprise-level workloads, Hitachi Accelerated Flash delivers the performance, cost points, capacity and environmental characteristics desired that alternative solid-state storage options cannot match. IT and business advantages include:

- 1,000,000 IOPS and sub-millisecond response times, consistent performance.
- 60% better cost per I/O than similar disk-based systems, with less space and power.
- 50% less administrative effort to save time and improve productivity.

More About
HUS VM
all flash

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USE CASE: FINANCIAL SERVICES APPLICATIONS

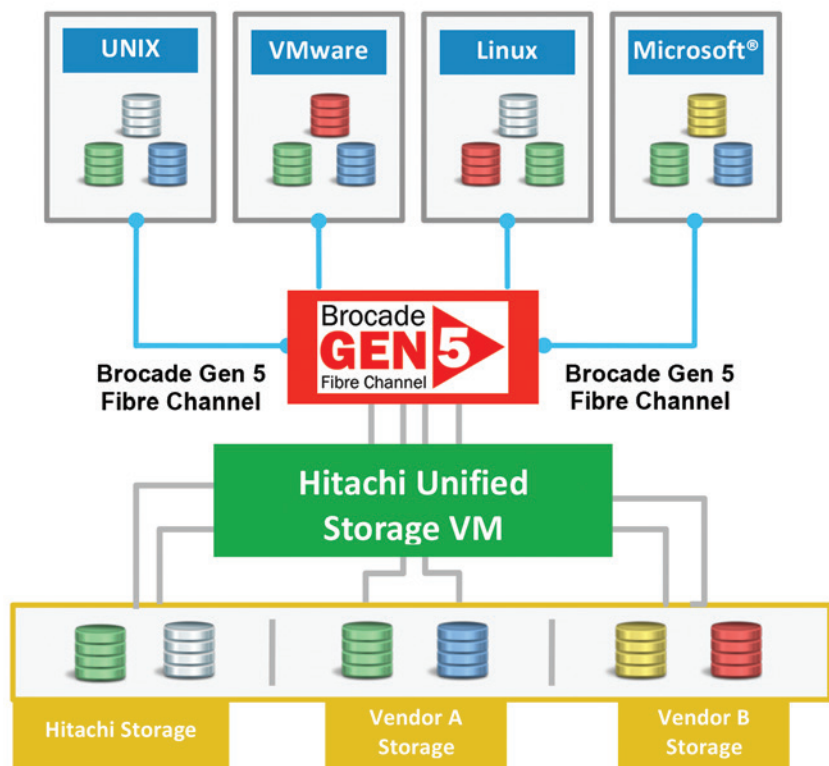
Known for demanding lightning performance in their IT environments, financial institutions seek superior performance and improved response times for online banking, analysis and processing. This is especially true for financial trading, where even micro-second response improvement translates into positive financials. They are looking to flash technologies to gain a competitive edge.

Hitachi Unified Storage VM All Flash System

- Accelerates application performance.
- Creates a virtual storage pool.
- Centralizes day-to-day administration.
- Enables new features on older storage systems.

Brocade Gen 5 Fibre Channel With Fabric Vision Technology

- Shatters application IOPS performance barriers with 420 million frames per second speed.
- Provides breakthrough diagnostics to minimize disruptions and downtime.



Together, Hitachi and Brocade provide no-compromise performance and data center efficiencies.

- 100% availability guarantee to lower risk and ensure data availability.
- 90% less refresh effort to accelerate innovation and business productivity.
- Higher flash density and capacity than comparable solid-state drive configurations.
- Complete upgradeability to tiered or unified storage system.

Hitachi Accelerated Flash storage modules fit into a 2U flash chassis. Each enclosure holds 12 flash modules to scale up to 38.4TB of flash storage. At 3.2TB, flash modules provide greater density than commodity solid state drives. Up to 8 flash enclosures can be housed in HUS VM, enabling more than 300TB of flash per system. You can confidently address the most demanding performance workloads while maintaining the same storage management environment, external storage virtualization support, superior uptime and advanced functionality you are accustomed to from Hitachi.

In addition, HUS VM employs Hitachi Dynamic Tiering for creating tiers of storage. This capability lets the system automatically optimize data placement by putting the most active data on Hitachi Accelerated Flash when the highest performance is required, and placing less-active data on cost-optimized, lower performance disk. Thin provisioning is included to reduce capacity requirements by increasing utilization of your storage. Coupled with external storage virtualization, even 3rd-party storage systems can participate in tiered storage with accelerated flash performance as data is migrated from slower storage to flash.

Business Benefits

- Improve the performance of virtualized applications with Hitachi Accelerated Flash.
- Simplify the storage environment by consolidating all data types in a high-performance unified system.
- Optimize storage costs with Hitachi Command Suite Mobility to automate the best mix of flash for the most active data.
- Reduce operating expenses by centrally managing virtualized storage systems from multiple vendors.
- Effectively manage virtual machine backup, restore and cloning operations.

Innovation is the engine of change, and information is its fuel. Innovate intelligently to lead your market, grow your company, and change the world. Manage your information with Hitachi Data Systems.

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USE CASE: DATABASE

Organizations such as online retailers seeking to speed up financial transactions for online transactional processing (OLTP) databases and improve response times for online analytical processing (OLAP) databases can benefit from flash solutions. The option of automated tiering allows critical data to be placed on high-level flash storage, while noncritical data can stay on lower-tier storage. Results include higher productivity and customer satisfaction.

Hitachi Unified Storage VM All Flash System

- Hosts entire database.
- Increases the transaction rates for OLTP.
- Reduces the response time for OLAP.
- Supports fastest access to all data with lower-cost per IOPS ratio at the expense of cost per gigabyte. (With tiering, focus is on cost per I/O. It keeps infrequently used data on capacity optimized storage for best cost per gigabyte.)



Brocade Gen 5 Fibre Channel With Fabric Vision Technology

- Enables hyper-scale OLTP deployments for data-driven applications.
- Minimizes risk and fault domains for high-density workloads with a data-center-proven network architecture.
- Detects and prevents performance bottlenecks.
- Increases application availability through proactive monitoring tools.

Hitachi Data Systems recognized the need for enterprise-level flash storage and designed technology from the ground up to implement it in current storage. Hitachi operating systems are optimized for flash technology, ensuring top performance. Storage virtualization capabilities of HUS VM make it easier for existing I/O-intensive applications to share in the benefits of a flash-based storage tier. Unlike HUS VM, some startup flash products do not have sophisticated tuning and diagnostics or resilience capabilities. They are technology islands that cannot share technologies. HUS VM, in contrast, offers complete upgradability with the combined strength of tiering and adapting a flash layer that may be shared across multiple applications.

Brocade Gen 5 Fibre Channel: Breakthrough Technology for Breakthrough Results

Flash storage may deliver top speed, but if the network infrastructure is not performing at the same level, that speed advantage may not be realized in real-world business transactions. With Fibre Channel networking used in 90% of the Fortune 1000 data centers, it is evident that the enhanced potential of advanced storage may be realized by Gen 5 Fibre Channel customers. Brocade, with its cut-through network architecture, ensures that flash storage speed is delivered, *fast*.

SOLUTION PROFILE

A proven, purpose-built network infrastructure, Brocade Gen 5 Fibre Channel switches enable breakthrough application performance, scalability and availability. They combine low latency and unmatched IOPS to maximize application performance with flash storage. Extreme performance enables the deployment of more servers, desktops and OLTP workloads.

But speed is only part of the equation; flash storage also requires a networking infrastructure that is highly resilient, scales easily and is simple to manage. Brocade Gen 5 Fibre Channel addresses these requirements through breakthrough innovations, including Fabric Vision technology. The combination of these enhanced capabilities allows administrators to accelerate application deployment and performance while reducing footprint, power, cooling, cabling and management costs.

Fabric Vision Technology

Brocade Fabric Vision technology, an extension of Brocade Gen 5 Fibre Channel, provides a breakthrough hardware and software solution that maximizes network uptime, simplifies SAN management, and provides unprecedented visibility and insight across the storage network. Offering innovative diagnostics, Fabric Vision technology minimizes disruptions and downtime and increases application availability through proactive monitoring tools that identify problems before they impact operations.

- **Flow Vision:** Identifies, monitors and analyzes specific application and data flows to maximize performance, avoid congestion and optimize resources. Flow Vision includes Flow Monitor, Flow Mirror and Flow Generator.
- **Monitoring and Alerting Policy Suite (MAPS):** Simplifies fabric-wide threshold configuration and monitoring by leveraging prebuilt rule or policy-based templates.

Brocade
6520 Switch
Details

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USE CASE: VIRTUAL SERVERS

For organizations such as telecommunications providers, very low latency and mixed, high IOPS are imperative for competitive response times. Varied workloads demand massive I/O in the provisioning of telecommunications applications. Flash technologies not only allow a greater number of virtual machines per host, but also, due to this VM density, may allow the data center to reduce the number of physical host servers. With support for more VMs, more user activity can be supported, minus the performance challenges. Further, in addition to capital and operating expenditure (capex and opex) savings, benefits include more transactions in less time and improved customer service.

Hitachi Unified Storage VM All Flash System

- Allows virtual servers to share the same storage with highly random workloads.
- Offers the highest random performance for virtual servers.
- Enables a dense VM-to-host ratio to reduce physical servers.

Brocade Gen 5 Fibre Channel With Fabric Technology

- Increases VM-density per physical server for greater server consolidation.
- Builds in high availability.
- Detects, prevents and diagnoses performance bottlenecks.



- **ClearLink Diagnostics:** Helps ensure optical and signal integrity for Gen 5 Fibre Channel optics and cables, simplifying the deployment and support of high-performance fabrics.
- **Bottleneck Detection:** Identifies and alerts administrators about device or ISL congestion, as well as abnormal levels of latency in the fabric.
- **Integration Into Brocade Network Advisor:** Provides customizable health and performance dashboard views to pinpoint problems faster, simplify SAN configuration and management, and reduce operational costs.
- **Critical Diagnostic and Monitoring Capabilities:** Help ensure early problem detection and recovery.
- **Nonintrusive and Nondisruptive Monitoring on Every Port:** Provides a comprehensive, end-to-end view of the fabric using capabilities integrated into hardware.
- **Forward Error Correction (FEC):** Enables recovery from bit errors in ISLs, enhancing transmission reliability and performance.
- **Credit Loss Recovery:** Helps overcome performance degradation and congestion due to buffer credit loss.
- **Real-Time Bandwidth Consumption by Hosts or Applications on ISLs:** Helps identify hot spots and potential network congestion.

Business Benefits of Brocade Gen 5 Fibre Channel

The benefits associated with Brocade Gen 5 Fibre Channel and its unique innovations for optimized storage performance and efficiency are compelling, and include:

- Low latency switching eliminates I/O bottlenecks and unleashes the full performance of flash storage.
- Up to 420 million frames per second speed shatters application IOPS performance barriers.
- Innovative diagnostic, monitoring and management capabilities deliver availability and serviceability.
- Massive scalability supports consolidation, while reducing complexity and costs.
- Backward compatibility with existing infrastructure minimizes the need to rip out and replace.

Learn More

As data demands increase and budgets remain stagnant, all-flash solutions with top-speed and optimized networking can help you address data center challenges. Hitachi Unified Storage VM all flash system with Brocade Gen 5 Fibre Channel together deliver blazing-speed performance, increased efficiency, and economic benefits to your IT infrastructure to drive your business forward. For more information about how these solutions can answer your data center challenges, please contact:

- Your Hitachi Data Systems representative or visit www.HDS.com.
- Your Brocade representative or visit www.brocade.com.

USE CASE: VIRTUAL DESKTOP INFRASTRUCTURE

Organizations such as legal firms need to improve user experience and management of virtualized desktops. Increasing information flow and the need for remote access to a variety of systems, including email, document management, billing and scheduling, heighten the demand for performance. Flash technologies can deliver. Results include higher productivity and employee satisfaction.



Hitachi Unified Storage VM All Flash System

- Speeds boot-up time for multiple desktops.
- Speeds response time for end users.
- Delivers a lower cost per desktop than hard disk systems.

Brocade Gen 5 Fibre Channel With Fabric Vision Technology

- Detects and prevents performance bottlenecks.
- Supports a higher number of virtual desktops.
- Overcomes performance challenges such as boot storms and traffic spikes.





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SP-166-A DG October 2013