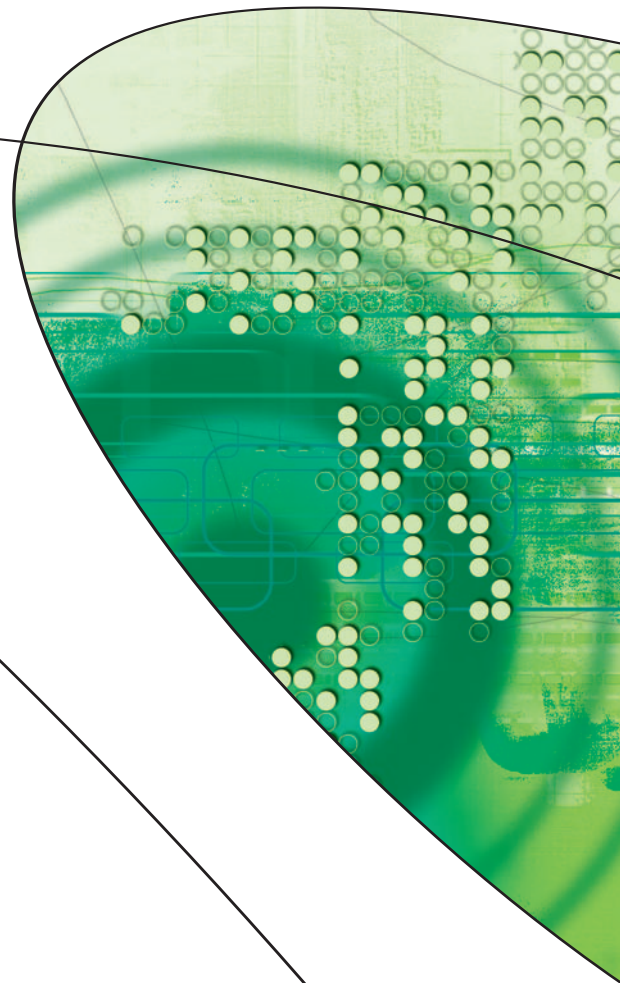# HITACHI
DATA SYSTEMS

Hitachi Lightning 9900™
V Series

Enterprise Storage Systems

Partner Beyond Technology

How do you simplify your storage infrastructure, protect your valuable information, and optimize your resources so that you can fully leverage your enterprise's knowledge capital? How do you ensure that your data is available 24/7 even when it's quickly outstripping your resources? How can you establish a flexible and quickly scalable infrastructure that will allow you to deploy new strategic applications easily?

Hitachi Lightning 9900™ V Series Enterprise Storage Systems

How do you make sure that your data is stored, managed, and protected appropriately over its lifecycle? The Hitachi Lightning 9900™ V Series of enterprise storage systems plays a key role in Hitachi Application Optimized Storage™ solutions. These systems, combined with Hitachi TagmaStore™ Universal Storage Platform and Hitachi Thunder 9500™ V Series modular storage systems, and integrated with advanced software and professional services, enable companies to closely align their business and IT objectives.

The Second Generation: Exploiting the Power of Intelligent Storage to Simplify Management

Lightning 9900 V Series systems are designed specifically for intelligent pooling of storage resources and innovative simplification through massive consolidation by itself or in conjunction with the Universal Storage Platform. Combined with storage area networking technologies, advanced storage applications to ensure business continuity, and the Hitachi Storage Area Management (SAM) Suite software, these systems can deliver the information infrastructure you need to gain a competitive advantage.

Lightning Strikes—Twice!

Look to the second generation of Hitachi enterprise storage systems for world-class benefits: Simplified infrastructure and management. Protection for your critical information. Optimized resource utilization. A reduced total cost of ownership (TCO) and a more rapid return on investment (ROI).

Hitachi Lightning 9970V™ and Lightning 9980V™ Systems—A New Generation of Benefits

Simplify Management with Massive Consolidation for a Reduced TCO and Accelerated ROI

- :: Consolidate systems and pool storage resources

- :: Reduce licensing, maintenance, and environmental costs

- :: Scale nondisruptively to over 140TB

- :: Industry-leading performance driven by the second-generation Hi-Star™ crossbar switch architecture

- :: Maintain performance as capacity scales with over 15GB/sec aggregate internal system bandwidth

- :: Centralize management with the Hitachi SAM Suite—modular software based on industry standards:

  - :: Application-centric view of storage

  - :: Policy-based automation

  - :: Broad heterogeneous storage device support

- :: Decrease infrastructure complexity with Virtual Storage Ports

- :: Concurrent support for UNIX, Microsoft Windows NT, Windows 2000, Windows Server 2003, Linux, Novell NetWare, HP OpenVMS, IBM z/OS®, and Transaction Processing Facility (TPF)

Protect Your Business Continuity and Provide High Availability to Internal Operations—and Your Customers

- :: 100 percent data availability guarantee

- :: Global 24/7/forever availability

- :: Instant, user-defined point-in-time copies enable quick recovery from outages

- :: Nondisruptive, real-time copies for backups, application testing, and data warehousing/data mining

- :: Long-distance remote replication for offsite redundancy with complete data integrity

- :: "Server-less" any-to-any copies

- :: Tapeless data vaulting

- :: No single point of failure—redundant, hot-swappable components

- :: Online microcode upgrades

- :: Hi-Track® "call-home" service/remote maintenance tool

Optimize Resources, Maximize Storage Utilization, and Improve Productivity

- :: Multidimensional scalability, including capacity, bandwidth, connectivity, workload mix, and embedded applications

- :: Set-and-forget management—automate manual functions and improve productivity

- :: Maximize storage utilization with Hitachi SAM Suite

- :: Maintain performance levels with hot spot eliminator software

- :: Easy coexistence of SAN and NAS with HDS-NetApp® Enterprise NAS Gateway

- :: Multiprotocol compatibility—Fibre Channel, iSCSI, FICON, and ESCON

- :: Complement with deployment of the Hitachi TagmaStore™ Universal Storage Platform for pooling in a tiered storage environment along with Hitachi Thunder 9500™ V Series modular storage systems to manage data across its lifecycle

Maintain Peace of Mind

Tops in Service and Support

With one of the highest rankings among IT customers when compared with industry competitors, Hitachi Data Systems consistently delivers exceptional service and support, including:

- :: Comprehensive professional services, ranging from strategic consulting to design, planning, and deployment; available through Hitachi Data Systems Global Solution Services.

This is the control you've been waiting for:

:: Simplified management

:: An open choice

:: Optimized resources

:: Business continuity

:: Reduced operational costs

:: Maximized return on technology investment

More for your enterprise, now and later:

:: Increase productivity

:: Shorten time to market

:: Adapt quickly to economic changes

:: Mitigate risk

:: Improve top and bottom line

:: Power to speed up complex decision-support queries and provide real-time analysis of customer behavior

A Key Component of Your Infrastructure—the Hitachi Lightning 9900 V Series

The Lightning 9900 V Series, with built-in virtual ports and secure multitenancy, is designed specifically to serve as a key component for your information infrastructure. These unique systems are made for intelligent pooling of storage resources and breakthrough simplification of complex infrastructures. Their broad capabilities allow for massive consolidation, flexible capacity, extreme bandwidth, and a variety of connectivity and protocol options—while actually reducing your TCO and accelerating your ROI. The Lightning 9900 V Series can serve as the starting point for managing data over its lifecycle.

Information and the ability to collect, analyze, and act on it quickly are the enablers for success. The Hi-Star crossbar switch architecture delivers.

"Through our own technical analysis, and in-depth interviews with customers, we found that the Lightning 9980V is an excellent storage consolidation solution. Based on the Lightning's performance, reliability, scalability, capacity, ease of management, and unique and powerful functionality, we recommend the [Lightning] 9980V to anyone considering a storage consolidation project."

—Tony Asaro, Senior Analyst, Enterprise Strategy Group Lab

The world's economy presents once unimagined challenges—and opportunities. Both are often accompanied by billions of transactions and enormous amounts of text, video, graphic, and audio data that are transferred every day, and growing exponentially. Just adding more storage is not the answer.

Now is the time to take a long-term look at your IT environment. And take control. Start with a storage platform that combines power and intelligence to simplify, protect, and optimize—putting you in charge, instead of at the mercy of a reluctant information infrastructure.

The second-generation Lightning 9970V™ and Lightning 9980V™ storage systems: Simplified centralized management. Sophisticated business continuity and storage management software. Virtualization-enabled to reduce infrastructure complexity. Choice of connectivity and protocols.

Choose the System That's Best for Your Operations

The Lightning 9900 V Series supports both open systems and z/OS servers simultaneously in direct-attached storage or networked configurations, allowing you to choose the optimal server for your applications and the best storage system to house your data. Powered by the Hi-Star crossbar switch architecture, the Lightning 9900 V Series removes the downtime and bottleneck risks normally associated with typical consolidated storage approaches. It is available in two models: the Lightning 9970V single-cabinet system and the Lightning 9980V multi-cabinet system.

Lightning 9980V—the world's first storage solution for massive consolidation

The performance and scalability of the Lightning 9980V system enables you to consolidate vast amounts of storage across open systems and mainframe servers. You can replace your previous storage systems with just one Lightning 9980V system, dramatically lowering your IT costs and extending your capital investment by consolidating storage resources and sharing information across disparate platforms. In fact, today's bottleneck-free Lightning 9980V system is twice as powerful, offers twice the capacity, and provides four times the cache of the first-generation Lightning 9900 Series. Indeed, customers are so confident about the scaling capabilities of the Lightning 9980V system that initial shipments now average 20TB.

- :: Form centralized host group pools
- :: Replace several systems with one to simplify and save
- :: Reduce management tasks and lower operational costs as productivity improves

Lightning 9970V—for smaller enterprises or distributed applications

The Lightning 9970V system, with its open systems and z/OS connectivity, offers you all the high-speed, high-availability characteristics of the advanced Lightning 9900 V Series in a single cabinet. This enables the Lightning 9970V system and its 18TB hot-swappable component design to play an important position in any number of environments. Assign the Lightning 9970V system to a typical data center storage role for slow-growth applications. Or, combine it with the Lightning 9980V system to deploy

your essential distributed strategies for ensuring data replication, disaster recovery, and information sharing.

- :: Deploy for truly manageable SAN strategies
- :: Implement for disaster recovery assurance
- :: Use for company-wide information sharing

Reduce Management and Infrastructure Complexity

Your information management needs and industry trends are now addressed with two enterprise-class storage systems, built specifically to support far-reaching business and IT objectives. The Lightning 9900 V Series systems offer a virtualization assist layer to ease storage management and better use resources. Virtual Storage Ports and Host Storage Domains allow host pooling at the Logical Unit level, optimizing connectivity and reducing network infrastructure. Hitachi Server Priority Manager (formerly Priority Access) quality of service manager software guarantees that your most critical applications get the highest level of service, while Hitachi Volume Security Manager software (formerly SANtinel) ensures authorized access.

This strategic combination—Virtual Storage Ports and Host Storage Domains with Server Priority Manager and Volume Security Manager software—forms the basis for a virtualization assist layer within the Lightning 9900 V Series systems, clearing the way for dynamic resource and performance management, as well as massive consolidation.

Manage It All with the Hitachi SAM Suite

The Hitachi SAM Suite software provides intuitive tools for streamlined storage management of distributed enterprise applications. It's built on industry standards, including the Common Information Model (CIM) and SNIA (Storage Networking Industry Association) Storage Management Initiative Specification (SMI-S). Compliance with these standards enables the Hitachi SAM Suite to manage a broad range of heterogeneous storage devices.

Major Platforms Supported

Open Systems

- :: Sun Solaris
- :: Microsoft Windows NT
- :: Microsoft Windows 2000
- :: Microsoft Windows Server 2003
- :: IBM AIX
- :: HP-UX
- :: Red Hat Linux
- :: SuSE Linux
- :: NetApp Data ONTAP
- :: Novell NetWare
- :: HP Tru64 UNIX
- :: SGI IRIX
- :: HP OpenVMS
- :: IBM DYNIX/ptx

Mainframe

- :: z/OS
- :: OS/390
- :: MVS/ESA
- :: MVS/XA
- :: TPF/MPLF
- :: VM/ESA
- :: VM/XA
- :: VM/HPO
- :: VSE/ESA
- :: VSE/SP(4.1)
- :: TPF
- :: Linux for zSeries

Always available, always up

:: Provides point-in-time copies for disaster recovery, tapeless data vaulting, data warehousing/data mining, or application testing

:: Enables real-time data movement and online data migration over virtually unlimited distances

:: Allows sophisticated and scalable backup/restore functions

:: Provides alternate path and clustering support

Accelerates access to information

:: Optimizes performance for business-critical online applications

:: Maximizes usage of unparalleled scalability

Empowers the transformation of information into knowledge

:: Supports information sharing in heterogeneous environments

:: Allows data exchange among UNIX, Windows NT, Windows 2000, Windows Server 2003, Linux, and z/OS platforms

Reduces storage management complexity and cost

:: Supports consistent procedures and policies for very large installations

:: Provides event, performance, and configuration management

:: Enables Hitachi storage systems management from any location

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The Hitachi SAM Suite:

:: Lowers total cost of ownership by simplifying storage management, streamlining processes, and increasing productivity

:: Enables management from the application to the disk

:: Ensures application availability and rapid deployment of new applications through automated provisioning

:: Reduces storage administration staff training time and enables faster response to change

Connectivity Simplified: Ready for SAN, NAS, iSCSI, ESCON, and FICON

These days, a number of storage network protocols and connectivity methods are available to match application requirements. Whether Fibre Channel, iSCSI SAN, or gigabit Ethernet NAS for open systems, IP for SAN interconnect, and ESCON or FICON for z/OS mainframes, the Lightning 9900 V Series systems support them all.

Backed by our Hi-Star architecture, end-to-end Fibre, and high-performance disks, the second-generation Lightning 9900 V Series systems easily handle simultaneous information access through multiple protocols and connection types.

Simplify Your Infrastructure and Management

The Lightning 9900 V Series Systems Are Made for Massive Consolidation

Simpler. Bigger. Faster. The Lightning 9980V and Lightning 9970V systems enable massive consolidation and centralization, resulting in newly simplified storage networking environments. Traditional bus-based storage systems as well as the overly complex direct connect architectures constrain capacity growth. As capacity is added, the architecture becomes a bottleneck and performance degenerates.

Our second-generation Hi-Star crossbar switch architecture lets you scale infinitely—without slowing down. As the need for capacity increases, both Lightning 9900 V Series systems leverage your initial investment and scale up seamlessly, without disrupting mission-critical business applications and without affecting performance. This means faster information access and faster conversion of information to knowl-

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edge that you can act on. And, more time for you to make decisions.

So, you can consolidate your current enterprise storage systems into one footprint while acquiring unmatched capacity and performance scalability. The savings are significant. You not only reduce your initial purchase costs, but you also lower your TCO over the lifetime of your system. By simplifying your information infrastructure and management efforts, you save on operating and resource expenditures. The Hi-Star architecture allows the Lightning 9900 V Series to support the information management demands of dynamic enterprises—no matter how big your data warehouse or how high your transaction rates.

Meanwhile, you spend less time managing storage. Gain more time for planning and new business efforts. Reduce the number of software licenses you need. Decrease the amount of money you spend on licensing and maintenance fees. The payback is visible on the IT floor—and on the books.

:: Fewer connections

:: Fewer storage management activities

:: Easy-to-handle, automated tools; staff can be assigned to other tasks

:: Aggressive use of embedded software applications

:: Reduced licensing and maintenance costs

:: Improved capacity utilization; less equipment required; lower costs

:: Reduced environmental expenses: floor space, power, and cooling

Protect Your Business-critical Information

100 Percent Data Availability, Guaranteed—a Continuing Tradition

Companies continue to shift attention and resources in support of business efforts and breakthrough initiatives to better position themselves for the future. When it comes to achieving these corporate goals, lack of performance or downtime are essentially the same. In either case, your users, partners, and customers have no access to the information they need to make decisions, keep the supply chain going, or make a purchase. You must adapt—or else.

With no single point of failure and sophisticated software, both second-generation Lightning 9900 V Series systems provide business continuity capabilities that ensure seamless backup and rapid recovery, while reducing management complexity and costs. The resilient internal switched architecture combined with redundant, online replaceable active components and mirrored cache set the stage for nondisruptive service and 24/7/forever data protection. Building on this solid platform, advanced copy tools—Hitachi TrueCopy™ Remote Replication, Hitachi ShadowImage™ In-System Replication, and Hitachi Cross-System Copy (formerly HiCopy) software for data movement between Thunder 9500 V Series and Lightning 9900 V Series storage, plus proven support for IBM GDPS (Globally Dispersed Parallel Sysplex)—further ensure that your Lightning 9900 V Series system will keep your business running. Bottom line: Hitachi Data Systems is so confident about the reliability of the Lightning 9900 V Series, we actually put our money on it.

An Infrastructure Solution—Protecting Your Data and Your IT Investment

:: No single point of failure

:: Highly resilient switched architecture

:: Redundant, hot-swappable components

:: Global dynamic hot sparing

:: Mirrored write cache with battery backup

:: ECC memory

:: Hi-Track "call-home" service/remote maintenance tool

:: Host failover and alternate path support

:: Nondisruptive microcode upgrades

:: RAID-1+ and RAID-5 support

:: Industry-leading point-in-time and remote copy software for data backup and rapid recovery

:: Extended SCSI copy support

:: Extended RAID group support

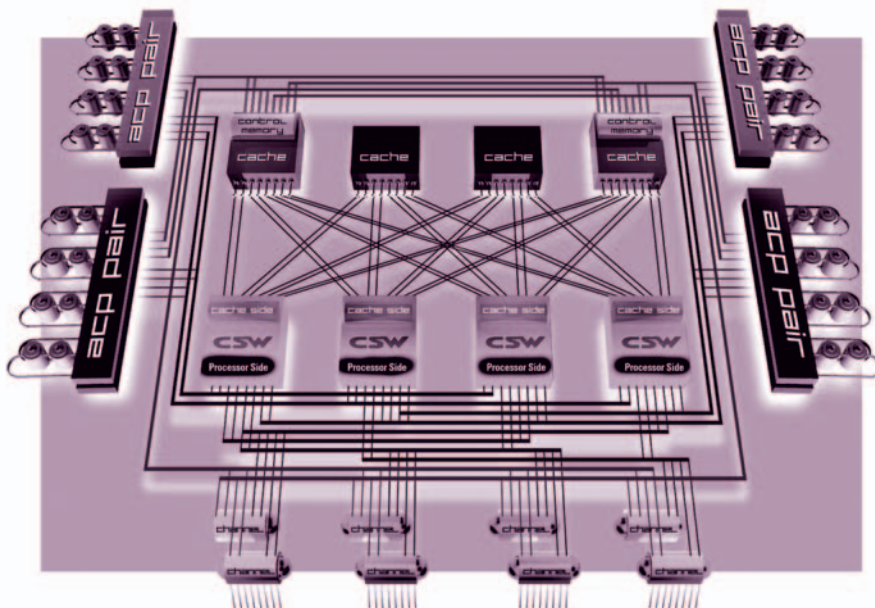:: Proven support for IBM GDPS

Open for Business—Providing Instant Access to Data around the Clock

The capacity to store your data—over 140TB. The speed to make it earn its keep. The Lightning 9900 V Series super carrier-class capabilities position it to handle enormous challenges. From this day forward, your information infrastructure can be designed to withstand the onslaught of strategic initiatives that will determine your company's outcome while providing the rapid ROI management mandates.

Second-generation, High-speed Switched Architecture

:: High-throughput, dual-ported 10,000RPM and 15,000RPM Fibre Channel disk drives

:: 32 concurrent data transfers

:: Fully addressable 128GB cache

:: Optional Hitachi Cache Residency Manager software (formerly FlashAccess) permanently assigns LUNs or LVIs into cache for high-speed data access

:: Extremely fast and intelligent cache algorithms

:: Flexible LUN support

:: Automated performance tuning

:: Support for Hitachi-compatible PAV for IBM z/OS (formerly Hitachi Parallel Access Volumes)

:: Separate, redundant data and command paths

Second-generation Hi-Star™ Crossbar Switch Architecture

Hi-Star architecture enables you to:

:: Consolidate and reduce management complexity and costs

:: Protect investment as business needs evolve

:: Scale capacity, run mixed workloads without performance impact

:: Keep up with surges in online transaction

:: Easily handle heavy-duty data mining queries

:: Expand connectivity, simplify your infrastructure

Optimize Resource Utilization

Use Powerful Hitachi Storage Software to Automate High Performance and Maintain Your Competitive Edge

Customers, partners, and employees have learned to expect instantaneous information access. As a result, it's increasingly important for you to anticipate surges in customer requests and to adjust to sudden increases in user demand. With the Lightning 9900 V Series systems, you can give them what they want as you increase productivity, shorten time to market, and mitigate risk. The Lightning 9900 V Series systems, powered by the revolutionary Hi-Star crossbar switch architecture, are the world's first truly bottle-neck-free carrier-class storage systems that support a "no wait" experience.

Enhancing the Lightning 9900 V Series Systems, Hitachi Volume Migration software (formerly CruiseControl) provides automatic self-tuning, eradicates "hot spots" through load balancing, and maintains predeter-mined performance levels. Cache Residency Manager software brings lightning-fast speed to both Lightning 9900 V Series systems by "locking" (and unlocking) data into cache in real time with read and write functions performed at cache speeds with-out disk access delays. Hitachi Dynamic Link Manager™ path manager software takes high performance out to the paths by providing dynamic load balancing. These functions, coupled with the virtualization assist layer in the Lightning 9900 V Series systems, ensure maintenance-free perform-ance for seamless scalability.

Extensive Options Support Uncomplicated Connectivity

- :: Fibre Channel, iSCSI, ESCON, and FICON compatibility enable integration for open systems SANs and z/OS systems

- :: Server Priority Manager/port throttling provides guaranteed quality of service (QoS)—maximum control

- :: SAN/NAS coexistence through the HDS-NetApp Enterprise NAS Gateway

Service that Makes the Most of Your Storage Investment

Data Lifecycle Management: Matching the Value of Your Data to the Cost of Storage

Managing and protecting your information assets while making the most of your stor-age investments are the key drivers for IT decision makers. Hitachi Data Systems takes a holistic approach to data lifecycle management—all the way from high-performance data storage and access to data retention for regulatory compliance, to business continuity and disaster recovery. We view it as a continuum in which the value of data rises and falls over time and in response to internal (customer loyalty research) and external events (legal obligations).

Hitachi Data Systems delivers across the spectrum of data lifecycle management with three solutions that build on our industry-leading storage technology—the Universal Storage Platform, Lightning 9900 V Series enterprise storage systems, and Thunder 9500 V Series modular storage systems—and our Hitachi SAM Suite of software

products. These systems can be deployed in a tiered architecture to match the value of data to the cost of storage. Your data from mission-critical, high-transaction-rate appli-cations can be stored on either the Universal Storage Platform or Lightning 9900 V Series systems, and then moved down to Thunder 9500 V Series systems as the data ages and needs to be retained to meet regulatory requirements.

Hitachi Data Systems offers two solutions, developed by Global Solution Services, which leverage Hitachi Data Retention Utility software (formerly Open LDEV Guard) and are powered by Open Text/IXOS Software eCONServer: Message Archive for E-mail and Message Archive for Compliance.

Professional Services for Planning, Design, and Deployment for Your Business Continuity, Data Migration, and Consolidation Requirements

Hitachi Data Systems Global Solution Services Professional Services teams provide architectural analysis, configuration plan-ning, and enterprise assessment to ensure that you maximize your storage investment and meet your business objectives. Consultants work with structured method-ologies that promote consistent results. Industry-leading Hitachi software, based on high-performance platforms, allows implementation of essential copy solutions. Consultants perform data relocation and migration tasks for massive consolidation projects and establish rock-solid backup and disaster recovery copy facilities that will keep your business up and running.

By supporting your special project activities and fully exploiting the capabilities of Hitachi storage software suites, Global Solution Services helps you quickly address storage management challenges while preserving critical business continuity.

Justify Your Purchase, Maximize Your ROI
Most enterprises today require that financial investment analysis be prepared prior to IT capital expenditures. Identifying hardware and software as "best-of-breed" is no longer sufficient justification for a major investment. Networked storage infrastructures and con-solidated storage systems have generally appeared to be cost-effective IT strategies, but in order to commit to significant capital expenditures, today's decision makers seek detailed, real-world information on operating expenses.

With this in mind, Hitachi Data Systems provides the Storage Economics Strategy Service so that you can make informed IT capital expenditure decisions. This service provides expert technical and thought leadership to promote and justify new storage initiatives. Global Solution Services consultants provide a current snapshot of storage allocated to each host, total capacity, and utilization and help you to better assess, analyze, design, and economically justify the most appropriate storage architecture to meet the organization's requirements.

Cold, hard facts create a solid business case for Hitachi storage, software, networked infrastructures, and consolidation. That's why the Storage Economics Strategy Service can play such a valuable role in the effort to simplify, protect, and optimize the storage environment that supports your enterprise.

Your Partner Beyond Technology

Hitachi Data Systems believes a company's information is a strategic asset. That's why we leverage our global Hitachi R&D resources to develop storage solutions with the performance, availability, and scalability to maximize your ROI and minimize your risk. We focus on your perspective while applying the best hardware, software, and services to satisfy your business needs. In fact, when you partner with Hitachi Data Systems, we're with you every step of the way.
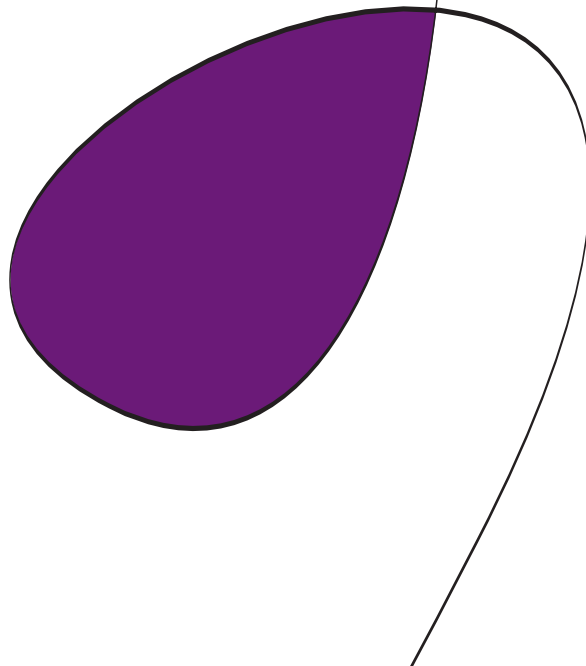
Hitachi Storage Software Solutions

Complementing and empowering the Lightning 9900 V Series storage systems, Hitachi storage software solutions include the following suites: Storage Area Management, incorporating the Performance Enhancement suite and Hitachi SAM Suite, and Business Continuity, incorporating Data Replication, Data Movement, and Backup and Recovery suites.

Hitachi Storage Area Management Suite

Simplified and optimized storage management. The **Hitachi SAM Suite** is based on industry standards, including the Common Information Model (CIM) and the Simple Object Access Protocol (SOAP), and it adheres to the Storage Networking Industry Association's Storage Management Initiative Specification (SMI-S). Compliance with these standards enables the Hitachi SAM Suite to support a broad range of heterogeneous storage systems and devices. The suite provides an application-centric view of storage, ensuring that you meet the service levels of your business unit users. The HiCommand® modules of the Hitachi SAM Suite include:

- :: **HiCommand Storage Services Manager**, powered by AppIQ, which allows enterprises to efficiently manage heterogeneous storage networks and optimize storage infrastructures to meet business objectives and manage storage as an application-focused utility

- :: **HiCommand Device Manager**, which manages, configures, and monitors Hitachi storage systems as well as Sun StorEdge 9900 and 9990 series and T3 storage systems

- :: **HiCommand Tuning Manager**, which provides enhanced performance monitoring and reporting for Hitachi storage systems, with a focus on the application

Application Modules

- :: **HiCommand QoS for Oracle***, which enables higher availability and better performance of Oracle-based applications

- :: **HiCommand QoS for Sybase***, which enables higher availability and better performance of Sybase-based applications

- :: **HiCommand QoS for Microsoft Exchange***, which enables higher availability and better performance of Exchange

- :: **HiCommand QoS for File Servers***, which delivers end-to-end capacity, performance, and user consumption management solutions for file servers

Business Modules

- :: **HiCommand Chargeback***, which provides powerful asset management and business unit chargeback capabilities, enabling organizations to align their storage infrastructure with business objectives and manage storage as an internal utility

- :: **HiCommand Path Provisioning***, which automates the end-to-end provisioning of hosts, SAN switches, and disk systems, thus speeding new application deployment and ensuring that mission-critical applications always have the storage resources they need.

A triumph over current storage management processes, the Hitachi SAM Suite software positions you to:

- :: **Increase asset utilization** and delay purchase of capital assets, which directly affects the bottom line

- :: **Improve data availability** with the control of the entire data path, from the application to the storage, and the automation of error-prone tasks

- :: **Improve organizational control** with advanced discovery, reporting, and monitoring

- :: **Enhance productivity** as tedious non-value-added tasks are automated and skilled employees can focus on more valuable activities
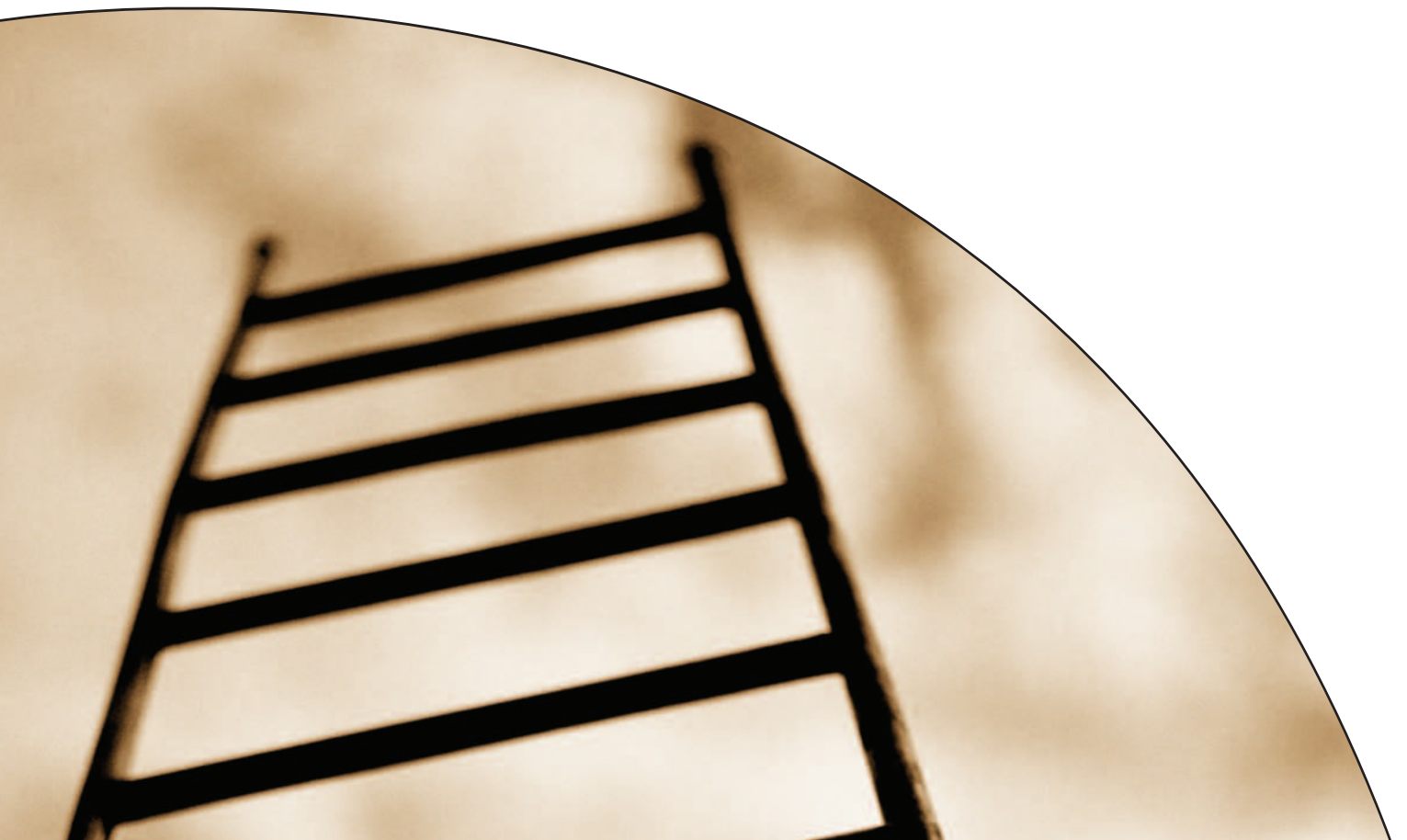
Hitachi Resource Manager™ Utility Package

Management tools in **Resource Manager** further help you to administer Lightning 9900 V Series systems. These include the Hitachi Graph-Track™ performance monitor feature, Cache Residency Manager, Hitachi Virtual Logical Volume Image (VLVI) Manager LUN sizer, Hitachi LUN Manager, and **Volume Security Manager** software, along with Hitachi Command Control Interface and Host Storage Domains. Volume Security Manager software controls host access to the Lightning 9900 V Series system LUNs in SAN environments, preventing unauthorized users from overriding other server disks.

Hitachi Command Control Interface software allows open systems users to manage TrueCopy and ShadowImage software from programs running on their host. This enables you to create batch streams that automate TrueCopy and ShadowImage operations using the command line interface.

VERITAS Volume Manager, a component of the VERITAS Foundation Suite, is available for flexible storage configuration, ensuring powerful, reliable performance.

*Powered by AppIQ

Performance Enhancement Suite

This robust software suite comprises **Hitachi Dynamic Link Manager, Compatible PAV for IBM z/OS**, and the **Performance Maximizer** storage system optimization package, which includes the **Hitachi Performance Monitor, Hitachi Volume Migration,** and **Server Priority Manager**, to accelerate information access and help you keep pace with today's evolving business environment.

Dynamic Link Manager software automates I/O load balancing, path failover, and recovery capabilities in the event a single path breaks down. **Compatible PAV for IBM z/OS** software permits multiple applications running on a zSeries or S/390® server to access the same information simultaneously, reducing queuing, decreasing batch times, and speeding up responses in high-transaction environments.

In the Performance Maximizer optimization package, **Volume Migration** software addresses the problem of scarce technical resources by providing automated and intelligent performance tuning capabilities to eliminate performance bottlenecks. Volume Migration software automatically monitors, analyzes, balances, and makes tuning recommendations. It moves logical volumes to help eliminate "hot spots," provide load balancing, and maintain performance levels. **Server Priority Manager** software allows you to define host access priority into the Lightning 9900 V Series systems, capitalizing on port virtualization technology. This provides control over production server access, without adversely affecting development servers, by monitoring I/O and transfer rates that can be displayed in graphical formats.

Hitachi Business Continuity Suite

Data Replication Suite

A well-planned business continuity strategy is essential if your organization is to survive planned or unplanned downtime. The Business Continuity Suite includes **TrueCopy, ShadowImage, Compatible Mirroring for IBM FlashCopy®** (formerly ShadowImage extension for FlashCopy), **Dynamic Link Manager, Compatible Replication for IBM XRC** (formerly Hitachi Extended Remote Copy), **Hitachi Business Continuity Manager** (formerly CopyCentral), and **Cross-System Copy** software.

TrueCopy software replicates information locally among the Lightning 9900 V Series systems within one data center, or to remote models in geographically dispersed locations—with minimum impact on performance. Seamlessly protecting your critical information right up to the point of an outage, TrueCopy software eliminates the complexities of multistep, manual, and tape recovery processes. **Compatible Replication for IBM XRC** creates z/OS synchronous remote copies over long distances using extenders.

ShadowImage software simultaneously duplicates logical volume images (LVIs) and logical units (LUNs) without disrupting service or performance of business-critical applications. Delivering parallel processing capabilities that significantly improve productivity by consolidating workload operations, ShadowImage software rapidly replicates information within the Lightning 9990 V Series systems without disrupting or affecting operations and performance levels. As a result, backups and tests can be conducted more completely and more frequently. Deploy applications faster—while safeguarding your critical information.

Compatible Mirroring for IBM FlashCopy is the only 100 percent functional, compatible solution with the IBM FlashCopy product. Hitachi operations are nondisruptive, allowing the main volume of each FlashCopy pair to remain online to all hosts for both read and write I/O operations. Once established, FlashCopy operations continue unattended to provide continuous data backup.
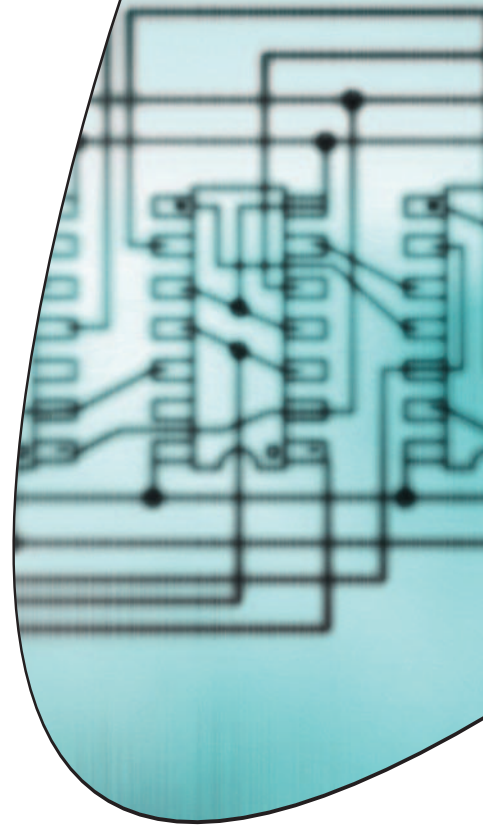
Business Continuity Manager software offers centralized replication management for IBM z/OS mainframe environments through a single, consistent interface based on familiar TSO/ISPF full-screen panels. Business Continuity Manager software automates ShadowImage and TrueCopy replication operations, enterprise-wide.

Dynamic Link Manager software provides automatic load balancing, path failover, and recovery capabilities in the event of path failure, ensuring no single path becomes overworked while others are underutilized.

Using ShadowImage, **Hitachi SplitSecond™ Solutions for Rapid Recovery**, a service that extends NanoCopy™ technology from Hitachi Data Systems to duplicate critical data with full protection against rolling disasters, allows you to initiate production at a backup location immediately following an outage. And the **Hi-Track** "call home" service/remote maintenance tool ensures maximum availability. Hi-Track continuously monitors Lightning 9900 V Series systems and automatically transmits collected hardware status information to a Hitachi Data Systems support center for proactive corrective action.

The only vendor with proven TrueCopy support for GDPS, Hitachi Data Systems offers a number of services to help you plan, integrate, and deploy Lightning 9900 V Series systems into your **Geographically Dispersed Parallel Sysplex** environment.

Backup and Recovery Suite

This suite offers you the **Hitachi Multiplatform Backup** software for open systems, **Hitachi Serverless Backup Enabler** (formerly e-Copy)**, VERITAS NetBackup,** and **CommVault Galaxy**.

Hitachi Multiplatform Backup allows you to save a significant amount of money by utilizing your already existing zSeries servers, ATL environment, and established procedures to back up your open systems data. The "any-to-any" connectivity of the Lightning 9970V and Lightning 9980V systems enable z/OS systems to access Windows NT, Windows 2000, Windows Server 2003, and UNIX open systems LUNs as 3390-3 or 3390-9 devices via standard utilities, such as FDR.

Hitachi Serverless Backup Enabler, a feature within the Lightning 9900 V Series systems, enables nondisruptive backups directly from disk to tape in a SAN environment. This eliminates server CPU and I/O overhead during actual data movement, which significantly shortens the time required for backups.

VERITAS NetBackup offers backup and recovery solutions for heterogeneous environments, delivering quick and reliable backup/recovery that can span from terabytes to petabytes in size. The VERITAS NetBackup Array Integration option and VERITAS NetBackup ServerFree Agent are tightly integrated with ShadowImage and Serverless Backup Enabler functions, enabling you to automate split-mirror backups on Hitachi storage systems with zero impact on application availability.
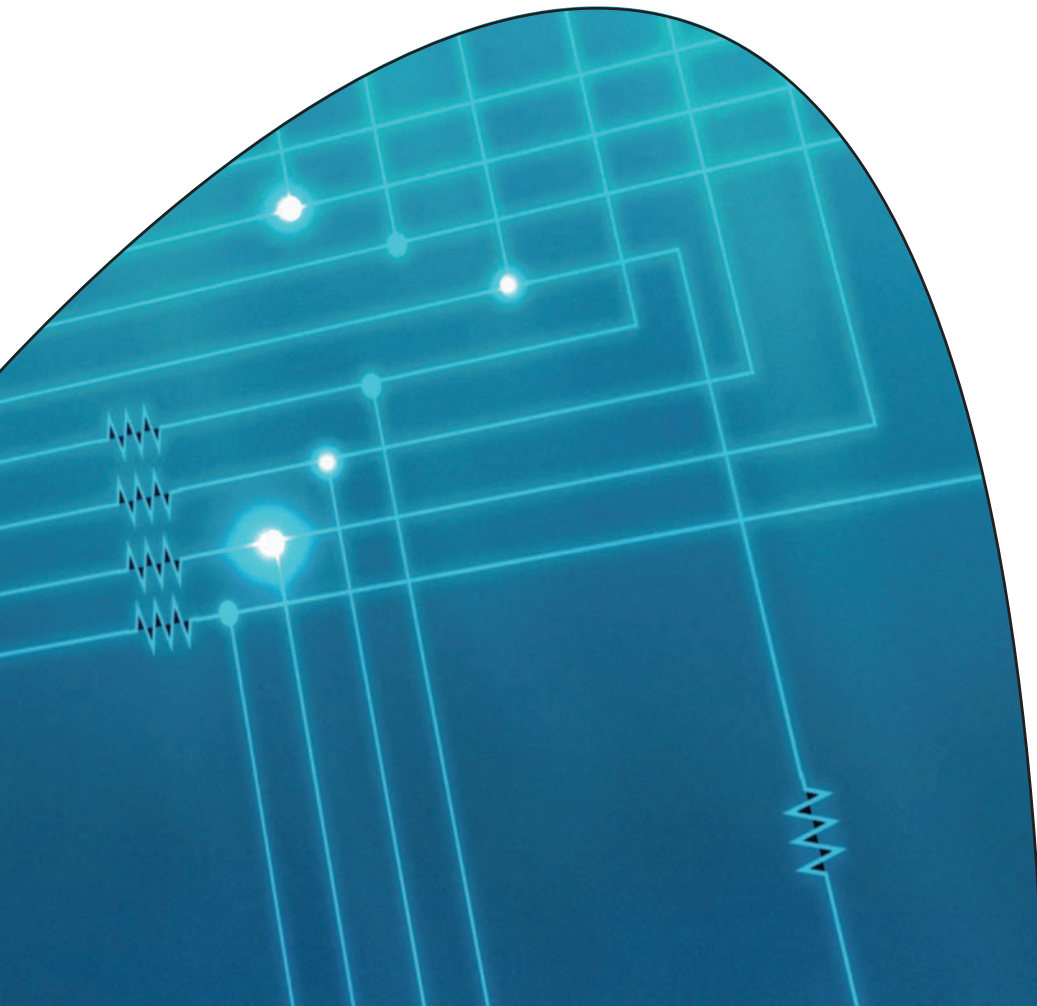
CommVault Galaxy data and storage management software can back up data from either a ShadowImage or TrueCopy mirror, allowing you to protect critical applications and data in Windows, Linux, and UNIX environments. Through policy-based management, you can seamlessly automate backup, recovery, migration, and snapshot management across topologies, resulting in substantial productivity gains and cost savings.

Data Movement Suite

This suite includes **Hitachi Cross-OS File Exchange** (formerly RapidXchange) and **Cross-System Copy** software. It is designed to eliminate many of the constraints related to exchanging information in heterogeneous environments. This enables you to rapidly share and deliver information more efficiently throughout the enterprise.

Cross-OS File Exchange software delivers high-performance, reliable data sharing among heterogeneous host platforms. Swift information transfer is achieved without placing additional burdens on the network infrastructure or tape transport equipment. Combined with **Cache Residency Manager** technology, Cross-OS File Exchange software quickly delivers information for applications such as data mining and data warehousing.

Cross-System Copy software allows you to move data between Universal Storage Platform, Lightning 9900 V Series, and Thunder 9500 V Series storage systems. With this capability you can also use your centralized Lightning 9900 V Series system to back up data from distributed Thunder 9500 V Series systems, or to push content from a Lightning 9900 V Series system to geographically dispersed Thunder 9500 V Series systems. And you can use Cross-System Copy software to move data within a tiered storage environment, as you match the value of data to the cost of storage.

Hitachi Storage Software

Hitachi Storage Area Management Suite

HiCommand Modules

HiCommand Storage Services Manager
HiCommand QoS for Oracle
HiCommand QoS for Sybase
HiCommand QoS for Microsoft Exchange
HiCommand QoS for File Servers
HiCommand Chargeback
HiCommand Path Provisioning
HiCommand Device Manager
HiCommand Tuning Manager

Hitachi Resource Manager

Hitachi Graph-Track performance
monitor feature
Hitachi Cache Residency Manager
Hitachi Virtual Logical
Volume Image (VLVI) Manager
Hitachi LUN Manager
Hitachi Volume Security Manager

Performance Enhancement Suite

Hitachi Compatible PAV for IBM z/OS
Hitachi Dynamic Link Manager
Performance Maximizer Package
Hitachi Performance Monitor
Hitachi Volume Migration
Hitachi Server Priority Manager

Third-party Products

Sun StorEdge Resource Management Suite
VERITAS Management Tools
VERITAS Foundation Suite
VERITAS SANpoint Control

Hitachi Business Continuity Suite

Data Replication

Hitachi TrueCopy Remote Replication
Hitachi ShadowImage In-System Replication
Hitachi Compatible Mirroring
for IBM FlashCopy
Hitachi Compatible Replication for IBM XRC
Hitachi Business Continuity Manager
Hitachi Dynamic Link Manager
Hitachi Data Retention Utility

Backup and Recovery

Hitachi Multiplatform Backup
Hitachi Serverless Backup Enabler
VERITAS NetBackup
CommVault Galaxy

Data Movement

Hitachi Cross-OS File Exchange
Hitachi Cross-System Copy

Operating System Support

Open Systems

Sun Solaris
Windows Server 2003
Windows 2000
Windows NT
HP-UX
IBM AIX
Red Hat Linux
SuSE Linux
Novell NetWare
HP OpenVMS
HP Tru64 UNIX
SGI IRIX
IBM DYNIX/ptx

Mainframe

z/OS
MVS/ESA
MVS/XA
TPF/MPLF
VM/ESA
VM/XA
VM/HPO
VSE/ESA
VSE/SP (4.1)
TPF
Linux for zSeries

Host Failover and Alternate Path Support

	Host Failover	Alternate Path
HP-UX	MC/Serviceguard	HP-UX/Logical Volume Manager
Sun Solaris	VERITAS Cluster Server	VERITAS VxVM Hitachi Dynamic Link Manager
IBM AIX	HACMP	Hitachi Dynamic Link Manager
Windows NT/2000/2003	MSCS	Hitachi Dynamic Link Manager
HP Tru64 UNIX	TruCluster	LMS
IBM DYNIX/ptx	ATAP	IBM proprietary software

For platform-specific feature availability, please contact
your Hitachi Data Systems account representative or
visit our Web site at www.hds.com.

Technical Specifications

	Lightning 9980V	Lightning 9970V
System Capacity		
Number of disk drives (with spares)	5 to 1024	5 to 128
Disk capacity (GB)		
10,000RPM	73	73
15,000RPM	73	73
10,000RPM	146	146
Total raw capacity per system (w/146GB)	147.5TB	17.5TB
Maximum usable capacity for RAID-5 (7+1)		
Open Systems	127.8TB	15TB
z/OS-compatible	119TB	14.1TB
Maximum usable capacity for RAID-1+		
Open Systems	73TB	8.9TB
z/OS-compatible	63.5TB	7.7TB
Maximum number of RAID groups/system	254 (with 8 spares) 252 (with 16 spares)	31 (with 4 spares)
Data cache		
Maximum	128GB	64GB
Minimum	4GB	2GB
Increments	4GB	2GB
Control memory		
Maximum	6GB	6GB
Minimum	2GB	2GB
Logical Device Support	Up to 8,192	Up to 8,192
Control Frame		
Client-Host Channel Adaptors (CHAS)		
Number of CHIP pairs	Up to 4	Up to 3
Simultaneous data transfers		
Per CHIP pair	8	8
Physical interfaces		
Per CHIP pair	Up to 16	Up to 16
Physical Interfaces per system		
Maximum	64	48
FICON	0, 8, 16, 24, 32	0, 8, 16, 24
Extended Serial Adapters™*/ESCON	0, 8, 16, 24, 32, 48	0, 8, 16, 24, 32
Fibre Channel (fiber-optic cable)	0, 8, 16, 24, 32, 48, 64	0, 8, 16, 24, 32, 48
Interface Speed (Fibre Channel)	2Gbit/sec	2Gbit/sec

	Lightning 9980V	Lightning 9970V
Maximum Virtual Storage Ports	8,192	6,144
Logical paths per system		
Extended Serial Adapters	Up to 8,192	Up to 6,144
Array Control Processor (ACP)		
Number of ACP pairs per system	Up to 4	1 or 2 **
Physical array paths (per ACP pair)	8	8
Maximum disks (per array path)	64	32
Simultaneous transfers (per ACP pair)		
To cache	8	8
To disk array	8	8
Transfer rate		
Per disk array path	Up to 100MB/sec	Up to 100MB/sec
Per ACP pair (to cache)	Up to 800MB/sec	Up to 800MB/sec
Hi-Star Crossbar Switch Architecture		
Aggregate bandwidth (data)	10.6GB/sec	5.3GB/sec
Aggregate bandwidth (control)	5.3GB/sec	2.6GB/sec
Array Frame		
Array frames per system	Up to 4	N/A
Spare drives per system (standard)		
Per drive RPM installed	1	1
Spare drives per system (maximum)	16	4

Physical Specifications	Control Frame	Integrated Control and Array Frame
Height	1,860mm (73.2in.)	1,860mm (73.2 in.)
Width (with two side panels)	782mm (30.77 in.)	782mm (30.77 in.)
Depth	800mm (31.5 in.)	800mm (31.5 in.)
Weight	553kg (1,216.6 lbs)***	796kg (1,751.2 lbs) ****
Heat	2.17kW***	4.52kW****
Power	2.31kVA***	4.87 kVA****

	Array Frame (one to four)
Height	1,860mm (73.2 in.)
Width (with two side panels)	750mm (29.5 in.)
Depth	800mm (31.5 in.)
Weight	755kg (1,661 lbs)*****
Heat	6.61kW
Power	7.16kVA

Hard Disk Drives GMR (Giant Magneto-Resistive)

Head Technology	73GB	73GB	146GB
Rotation Speed	10,025RPM	14,904RPM	10,025RPM
Form Factor	3.5-inch LP	3.5-inch LP	3.5-inch LP
Media Diameter	3.0 in.	2.5 in.	3.0 in.
Actuator	Rotary	Rotary	Rotary
Servo System	Digital	Digital	Digital
Interface	FC-AL	FC-AL	FC-AL
Internal Transfer Rate			
Inner Zone	44.2MB/sec	74.5MB/sec	57.3
Outer Zone	74.0MB/sec	111.4MB/sec	99.9
Average Seek Time			
Read	4.9ms	3.8ms	4.9ms
Write	5.4ms	4.2ms	5.4ms

    * Extended Serial Adapters are compatible with ESCON protocol.
   ** Only one with entry level ACP.
  *** One controller, 64GB cache, 4 ACP pairs, 32 Fibre Channel ports.
 **** One disk array frame, 256 disk drives, 18,371GB raw capacity using 73GB hard disk drives.
***** One full system, 32GB cache, 1 ACP pair, 24 Fibre Channel ports, and 128 disks.

Note: All capacities are based on 1GB=1,000,000,000 bytes.