Hitachi Freedom Storage™

Lightning 9900™ V Series

HITACHI
DATA SYSTEMS

The second generation:
Exploiting the power of intelligent storage to simplify management.

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?

The Lightning 9900™ V Series is designed specifically to serve as the foundation for intelligent pooling of storage resources and breakthrough simplification through massive consolidation. Bringing new levels of availability and performance, the Lightning 9900 V Series, combined with advanced storage applications, storage area networking technologies, and the HiCommand™ management framework, delivers the information infrastructure you need to gain a competitive advantage.

Lightning strikes—twice!

Hitachi Freedom Storage™

Lightning 9900 V Series

Introducing the next-generation intelligent storage systems with 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 Freedom Storage Lightning 9970V and Lightning 9980V—Benefits

> Simplify management and provide high availability to internal operations—and your customers
  - Consolidate systems and pool storage resources
  - Scalable with non-disruptive expansion to over 70TB
  - Global 24/7/forever availability
  - Industry-leading performance driven by our second-generation Hi-Star™ switched architecture
  - Over 15GB/sec aggregate internal system bandwidth
  - Single system management through virtualization-enabled functions
  - Concurrent UNIX®, Microsoft® Windows NT®/Windows® 2000, Linux®, Novell® NetWare®, OpenVMS™, TPF, and OS/390® connectivity

> Protect your business continuity and grow sales with built-in backup
  - 100% data availability guarantee
  - Instant, user-defined point-in-time copies—recover quickly from disasters
  - Non-disruptive, real-time copies for backups, application testing, and data warehousing/data mining
  - Off-site redundancy with complete data integrity
  - "Server-less" any-to-any copies
  - Tapeless data vaulting
  - Power to speed up complex decision support queries
  - Real-time analysis of customer behavior

> Optimize resources, increase your ROI with massive consolidation and simplified management for a reduced TCO
  - Multi-dimensional scalability, including capacity, bandwidth, connectivity, workload mix, and embedded applications
  - Investment protection—connect Lightning 9960 array frames to Lightning 9980V control frames
  - Centralized storage management with the HiCommand™ Management Framework—open, extensible, modular storage management software based on industry standards:
    - Seamless integration of best-of-breed products
    - Policy-based automation
    - Manages multi-vendor storage systems from any location
  - Multiprotocol compatibility—Fibre Channel, FICON™, and ESCON®
  - Simplified heterogeneous host access to dynamic storage pools
  - Easy convergence of SAN and NAS
  - Reduced licensing and maintenance costs
  - Set-and-forget management

> Count on exceptional service and support
  - Survey by FIND/SVP places Hitachi Data Systems *Number One in overall service and support as well as technical performance*

The Hitachi Freedom Storage™ Lightning 9900™ V Series

The Lightning 9900 V Series, with built-in virtualization-enabled functions, is designed specifically to serve as the foundation 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 native connectivity/protocol options—while actually reducing your total cost of ownership (TCO) and accelerating your return on investment (ROI).

INFORMATION AND THE ABILITY TO COLLECT, ANALYZE, AND ACT ON IT QUICKLY, ARE THE ENABLERS FOR SUCCESS. OUR HI-STAR™ SWITCHED ARCHITECTURE DELIVERS.

The world's economy presents all of us with once unimagined challenges—and opportunities. Both are often accompanied by billions of transactions and enormous amounts of text, video, graphical, 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. *Control is within reach.* 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 Lightning 9970V and Lightning 9980V systems are powered by our second-generation Hi-Star switched architecture. *In fact, today's bottleneck-free Lightning 9980V system is twice as powerful, provides twice the cache, and offers twice the capacity of the first Lightning 9900 Series generation.*

Open for business, the Lightning 9900 V Series provides instant access to data around the clock

> 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" predictive maintenance service
> Host failover and alternate path support
> Non-disruptive microcode upgrades
> RAID-1+ and RAID-5 support
> Industry-leading point-in-time and remote copy software for data backup and rapid recovery
> Proven GDPS™ support

The next-generation Lightning 9970V and 9980V storage systems: Simplified single management framework. Virtualization-enabled to reduce management complexity. Choice of native connectivity and protocols.

SIMPLIFY

Choosing the system that's best for your operations

The Lightning 9900 V Series supports both open systems and S/390® servers simultaneously in direct attached or networked configurations, allowing you to choose the optimal server for your applications. The Lightning 9900 V Series is available in two models: the Lightning 9970V and the Lightning 9980V.

Lightning 9980V—the world's first storage solution for massive consolidation.
The Lightning 9900 V Series, powered by the lightning-fast, Hi-Star switched architecture, removes the downtime and bottleneck risks normally associated with typical consolidated storage approaches. The performance and scalability of the multi-cabinet 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.

> Form centralized host group pools

> Replace several systems with one to simplify and save

> Reduce management tasks, lower staff costs

Lightning 9970V—a key piece for your enterprise infrastructure.
The Lightning 9970V system, with its open systems and OS/390 robust channel 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 9TB hot-swappable component design to play an important position in any number of environments. Assign the Lightning 9970V system to a typical storage role for sustained growth. Or, enact your essential distributed strategies for ensuring data replication, disaster recovery, and information sharing.

> Deploy for truly manageable SAN strategies

> Implement for disaster recovery assurance

> Utilize for company-wide information sharing

Major Platforms Supported

Open Systems
> SUN™ Solaris™
> Microsoft Windows NT
> Microsoft Windows 2000
> IBM® AIX®
> HP-UX®
> IBM (Sequent®) DYNIX/ptx®
> SGI™ IRIX®
> Novell NetWare
> HP™ (Compaq®) Tru64™ UNIX
> Linux
> HP(Compaq) OpenVMS

Mainframe
> OS/390
> MVS/ESA™
> MVS/XA™
> TPF/MPLF
> VM/ESA®
> VM/XA
> VM/HPO
> VSE/ESA™
> VSE/SP(4.1)
> TPF

Simplify Your Infrastructure and Management

The Lightning 9900 V Series systems are made for massive consolidation

Traditional bus-based storage systems constrain capacity growth. As capacity is added, buses become a bottleneck, and performance degenerates. With the Hi-Star switched architecture and bandwidth-rich Lightning 9900 V Series storage systems, 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.

This massive consolidation is made possible by the latest version of our Hi-Star switched architecture, which powers the second-generation Lightning 9970V and Lightning 9980V systems. Hi-Star 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.

Hi-Star Switched Architecture
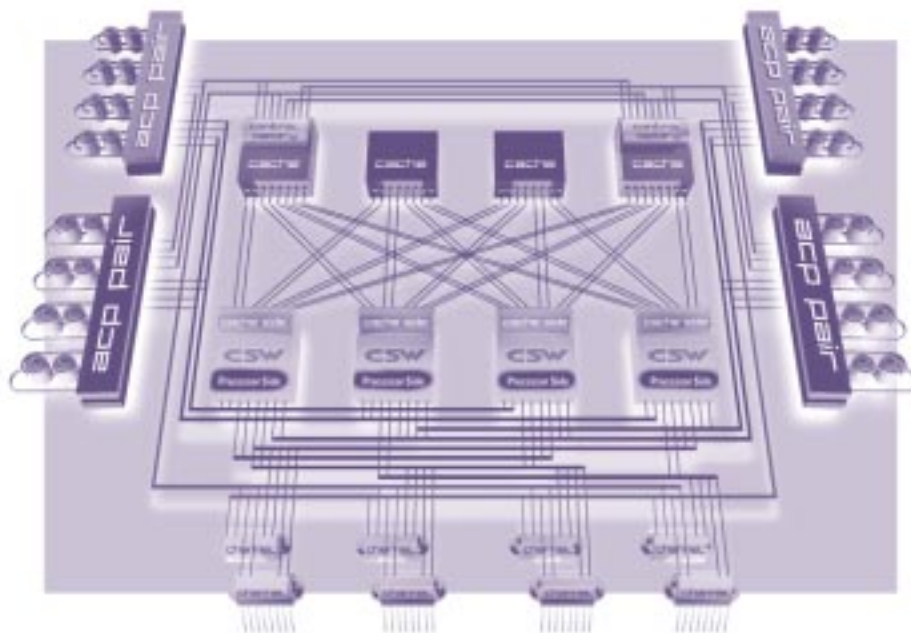
> Protects investment as higher levels evolve
> Controls large amounts of data with single span
> Provides convenient view of storage pooling
> Reduces physical complexity
> Works with evolving virtualization architecture
> Defines span of control with Host Storage Domains
> Optimizes connectivity
> Reduces physical connections
> Lowers complexity and cost
> Provides more overall connections
> Enables consolidation

ACP   Array Control Processor
CSW   Cache Switch

Virtualization-enabled to reduce connectivity complexity

We anticipated your information management needs and industry trends with two enterprise-class, virtualization-enabled storage systems built specifically to support far-reaching business and IT objectives. The new Lightning 9900 V Series systems offer a virtualization assist layer to ease storage management and better utilize resources. Host Storage Domains allows host pooling at the Logical Unit level, optimizing connectivity and reducing network infrastructure. Priority Access guarantees that your most critical applications get the highest level of service, while Hitachi SANtinel™ ensures authorized access.

The strategic combination—Host Storage Domains, Priority Access, and SANtinel—form the basis for a new virtualization assist layer within the Lightning 9900 V Series systems, clearing the way for massive consolidation and simplified infrastructure management. The Lightning 9980V and Lightning 9970V systems are open to dynamic resource and performance management, truly massive consolidation, plus *compatibility with Hitachi and other vendor virtualization strategies.*

Manage it all with the HiCommand™ Management Framework

HiCommand software is the storage management framework that provides open and intuitive tools for streamlined storage management. With the HiCommand Management Framework, storage administrators can manage, monitor, and tune Lightning 9900 V Series, Lightning 9900 Series, Hitachi Freedom Storage™ Thunder 9200™, and Sun StorEdge™ storage systems via a single graphical user interface (GUI).

HiCommand Management Framework:

> Shortens the storage administration staff training ramp and enables faster response to change

> Lowers your TCO by simplifying storage management, streamlining processes, and increasing productivity

> Delivers real freedom of choice—the HiCommand Management Framework seamlessly integrates with a variety of independent software vendor products

Connectivity simplified for the future: ready for SAN, NAS, ESCON, and FICON

These days, a number of storage network protocols and connectivity methods are available to match application requirements. Whether Fibre Channel SANs, or gigabit Ethernet NAS for open systems and SAN interconnect, or ESCON and FICON for z/OS™ and S/390 mainframes, the Lightning 9900 V Series will support them all natively.

Backed by the Hi-Star switched 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 connections.

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

Protect Your Business-critical Information

100% data availability— guaranteed—a continuing tradition

With no single point of failure, 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 non-disruptive service and 24/7/forever data protection. Building on this solid platform, our advanced copy software tools—Hitachi TrueCopy™, Hitachi ShadowImage™, and NanoCopy™—plus proven support for GDPS, further ensure that your Lightning 9900 V Series system will keep your business running. Bottom line—we are so confident about the reliability of the Lightning 9900 V Series, we actually put our money on it.

The Lightning 9900 V Series— an infrastructure solution that protects your data and your IT investment

The capacity to store your data—up to over 70TB. 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
> Virtualization-enabling layer
> Web-based management and Java™ SPI/RMI
> Extended SCSI copy support
> Network storage blades
> Extended RAID group support
> High-throughput 10,000RPM and 15,000RPM dual-ported Fibre Channel disk drives
> 32 concurrent data transfers
> Fully addressable 64GB cache
> Optional Hitachi FlashAccess™ permanently assigns LUNs or LVIs into cache
> Extremely fast and intelligent cache algorithms
> Flexible LUN support
> Automated performance tuning
> Support for Hitachi Parallel Access Volumes (HPAV) and Multiple Allegiance (MA)
> Separate, redundant data and command paths
> Support of existing Lightning 9900 Series array frames and disks for investment protection

PROTECT

Plus, extensive connectivity

> Fibre Channel, FICON, HPAV, and IBM® FlashCopy® compatibility enable integration for SANs and large S/390 systems
> Priority Access/port throttling provides guaranteed quality of service (QoS), maximum control

Data Protection Services for special projects, including migration and massive consolidation

Our Data Protection Services team is trained in architectural analysis, configuration planning, and enterprise assessment. We work with structured methodologies that promote consistent results. Our industry-leading software—TrueCopy and ShadowImage, based on high-performance Lightning 9900 V Series platforms—allows us to implement essential copy solutions. We perform data relocation and migration tasks for massive consolidation projects. And we 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 our Hitachi Freedom Storage Software Suites, we help you quickly address storage management challenges while preserving critical business continuity.

OPTIMIZE

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 and Windows 2000, Linux, and S/390 platforms

Reduces storage management complexity and cost

> Supports consistent procedures and policies for very large installations

> Provides event, performance, and configuration management

> Enables Hitachi Freedom Storage systems management from any location

Optimize Resource Utilization

Use powerful Hitachi Freedom Storage Software to automate high performance and maintain your competitive edge

Companies continue to shift attention and resources in support of e-business efforts and breakthrough initiatives to better position themselves for the future. When it comes to achieving these corporate goals, downtime is the enemy. Adapt—or else.

It's increasingly important to anticipate surges in customer requests and to adjust to sudden increases in user demand. Supported by the bottleneck-free architecture of the Lightning 9900 V Series, Hitachi CruiseControl™ provides automatic self-tuning, eliminates "hot spots" through load balancing, and maintains predetermined performance levels. Hitachi FlashAccess 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 without disk access delays. Hitachi Dynamic Link Manager™ 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 performance for seamless scalability.

HITACHI FREEDOM STORAGE SOFTWARE SOLUTIONS

Our Hitachi Freedom Storage Software Solutions include the following suites: Storage Area Management Suite, Business Continuity Suite, Backup and Recovery Suite, Performance Enhancement Suite, and Data Movement Suite.

Storage Area Management Suite

Simplified and optimized storage management. Open and extensible, the **HiCommand™ Management Framework** is based on industry standards, including the Common Information Model (CIM), the Simple Object Access Protocol (SOAP), and eXtensible Markup Language. Adherence to these standards enables the snap-in of software developed by Hitachi or complementary independent software vendor offerings. As a result, the HiCommand Management Framework is customizable and easily integrates with existing infrastructures to optimize storage management. Beginning with the **HiCommand Device Manager** module, the HiCommand Management Framework will expand to provide a full suite of storage management applications.

The Device Manager module enables you to configure, monitor, manage, and tune Lightning 9900 V Series, Lightning 9900 Series, Hitachi Freedom Storage Thunder 9200™, Sun StorEdge™ 9900 Series and Sun StorEdge T3 systems, via a single graphical user interface (GUI) over an IP connection device. Working at the logical or physical level, Device Manager simplifies storage management complexities, allowing existing IT resources to be more productive.

A triumph over current storage management processes, the HiCommand Management Framework positions you to:

> **lower TCO**
> reduces the complexity and effort needed to perform storage management tasks

> **simplify storage management**
> single-screen, intuitive GUI requires less training and expertise than dispersed tool sets, thereby improving productivity

> **enables seamless integration**
> integrates the best-of-breed third-party software. Open APIs allow ISV products to seamlessly integrate into the HiCommand Management Framework, giving you more freedom to choose how you manage your storage assets.

The Storage Area Management Suite, including **HiCommand** and its unique management framework and tools and **Hitachi Resource Manager™**, dramatically reduces storage management concerns, and makes it possible for you to increase your own productivity. Resource Manager, a package of management utilities, includes Hitachi Graph-Track™, FlashAccess, Hitachi Virtual Logical Volume Image (VLVI) Manager, Hitachi LUN Manager, and SANtinel. Resource Manager eases storage management processes and enhances your ability to address oncoming performance and capacity requirements.

Hitachi Command Control Interface allows open systems users to manage TrueCopy and ShadowImage 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.

With the addition of **Sun StorEdge Resource Management Suite** software, you can also access centralized control, reporting, and analysis for storage management across the enterprise. The Sun StorEdge Suite automates the discovery, monitoring, alerting, collecting, and reporting of hundreds of key storage statistics. Reports include information on distributed logical resources, such as file systems and directories, and physical resources, such as disks, SAN interconnects, and computers within open systems environments. With this information, you can optimize storage utilization and better manage capacity upgrades, saving money in the process. **SANtinel** controls host access to the Lightning 9900 V Series system LUNs in SAN environments, preventing unauthorized users from overriding other server disks.

Business Continuity Suite

A well-planned business continuity strategy is essential if your organization is to survive planned or unplanned downtime. Our Business Continuity Suite includes **TrueCopy** technology, **NanoCopy, ShadowImage, Dynamic Link Manager, Hi-Track, Hitachi SplitSecond™ Solutions, Hitachi Extended Remote Copy (HXRC), Hitachi Parallel Access Volume (HPAV)/Multiple Allegiance (MA), Geographically Dispersed Parallel Sysplex™**, and our **Data Protection Services.**

Designed for continuous access, **TrueCopy** software updates and maintains reliable data copies at a secondary site from one Lightning 9900 V Series system to another.

TrueCopy replicates information locally between the Lightning 9900 V Series systems within one data center, or to remote models in geographically dispersed locations—with minimum impact on performance. TrueCopy seamlessly protects your critical information right up to the point of an outage, eliminating the complexities of multi-step, manual, tape recovery processes.

Hitachi ShadowImage software simultaneously duplicates logical volume images (LVIs) and logical units (LUNs) without disrupting service or perform-ance of business-critical applications. ShadowImage delivers parallel processing capabilities that significantly improve productivity by consolidating workload operations. ShadowImage 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.

NanoCopy software, based on TrueCopy, is an industry first and can replicate data between any number of primary systems and any number of secondary systems anywhere in the world—with full data integrity. Using ShadowImage, **SplitSecond Solutions** extend the functionality of NanoCopy to duplicate critical data with full protection against rolling disasters, allowing you to initiate production at a backup location immediately following an outage. **Dynamic Link Manager** 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. **HPAV** permits multiple applications running on an S/390 server to simultaneously access the same informa-tion. **HXRC** creates OS/390 synchronous remote copies over long distances using extenders. And the **Hi-Track** "call-home" system, our predictive maintenance system, 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.

We offer a number of services to help you plan, integrate, and deploy your **Geographically Dispersed Parallel Sysplex** environment with proven TrueCopy support for Lightning 9900 V Series systems.

Backup and Recovery Suite

This suite offers you the **Hitachi Multiplatform Backup/Restore (HMBR)** software for open systems, **Hitachi e-Copy, VERITAS NetBackup™**, and **Tantia Technologies® HARBOR® Backup. HMBR** allows you to save a significant amount of money by utilizing your already existing S/390 host, ATL environment, and established procedures to back up your open systems data. The "any-to-any" connectivity of the Lightning 9970V and 9980V systems enables S/390 systems to access Windows NT, Windows 2000, and UNIX open systems LUNs as 3390-3 or 3390-9 devices via standard utilities such as FDR.

Hitachi e-Copy, a feature within the Lightning 9900 V Series systems, enables non-disruptive backups directly from disk to tape in a storage area network (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 Hitachi ShadowImage and e-Copy functions, enabling you to automate split-mirror backups on Hitachi Freedom Storage systems with zero impact on applications availability.

Tantia Technologies HARBOR Backup safeguards information with a premier, user-controlled, centralized backup and recovery solution for distributed environments. Running on the Lightning 9900 V Series systems, HARBOR Backup protects data while improving recovery processes.

Performance Enhancement Suite

This robust suite comprises **CruiseControl, Priority Access, FlashAccess, Parallel Access Volume/Multiple Allegiance, Hitachi Graph-Track, Dynamic Link Manager,** and the **Performance Maximizer Package,** to accelerate information access and help you keep pace with today's evolving business environment.

CruiseControl addresses the problem of scarce technical resources by providing automated and intelligent performance tuning capabilities to eliminate perform-ance bottlenecks. **Priority Access** 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. **FlashAccess** helps you meet performance requirements right up to the maximum raw capacity while providing access to information at lightning-fast speeds. **HPAV** permits multiple applications running on an S/390 server to access the same information simultaneously. **MA** extends this ability to applications running on multiple S/390 servers. Together, HPAV and MA reduce queuing, which results in decreased batch times and rapid responses in high-transaction environments. **Graph-Track** offers the scope to monitor all aspects of hardware performance from a centralized utility. Through a GUI, information can be exported in multiple formats quickly and easily for analysis and reporting programs. Graph-Track displays real-time or historical information for all connected Lightning 9900 V Series systems. **Dynamic Link Manager** automates I/O load balancing, path failover, and recovery capabilities in the event a single path breaks down.

Our special **Performance Maximizer Package** includes the **Hitachi Performance Monitor** and **CruiseControl** for intelligent performance tuning. CruiseControl automatically monitors, analyzes, balances, and makes tuning recommendations, as well as moves logical volumes to help eliminate "hot spots," provide load balancing, and maintain performance levels. The third component, **Priority Access,** provides the highest level of service access, working along with **Hitachi Host Storage Domains** and **VERITAS Volume Manager** in the virtualization assist layer.

Data Movement Suite

This suite includes **Hitachi RapidXchange™, Data Protection Services,** and **Tantia Technologies HARBOR File Transfer.** 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.

Hitachi RapidXchange 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 **FlashAccess** technology, RapidXchange quickly delivers information for applications such as data mining and data warehousing. **Tantia Technologies HARBOR File Transfer** adds automation to large data file transfers at ultra-high channel speeds in either direction between open systems and mainframe servers. After splintering large files into more manageable pieces, HARBOR File Transfer directs the data in multiple streams through Lightning 9900 V Series systems, making your information available and accessible at stellar rates.

Our **Data Protection Services** team ensures continuous access to information while we carry out plans to restructure operations or consolidate decentralized systems into an existing center. Data Protection Services incorporates components of the Business Continuity Suite for application with Hitachi Freedom Storage systems. By combining our services and software with our virtualization-enabled Lightning 9900 V Series systems, we offer you a complete solution not only for day-to-day business applications, but also to implement the processes involved in duplicating data to both local and remote locations for disaster recovery.

With the Lightning 9980V and Lightning 9970V systems, optimizing your resources ensures that a reduced TCO is part of the deal

Simpler. Bigger. Faster. The next-generation Lightning 9980V and Lightning 9970V systems enable massive consolidation and centralization, resulting in newly simplified storage networking environments. Spend less time managing storage. Gain more time for planning and new business efforts. Reduced amount of software, less money spent 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 floor space, power, and cooling; reduced environmental expenses

Absolutely bottleneck-free, the Lightning 9900 V Series systems deliver optimum service— the experience your customers demand

Customers, partners, and employees have learned to expect instantaneous information access. 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 switched architecture, are the world's first truly bottleneck-free carrier-class storage systems that support a "no wait" experience.

Our second-generation Hi-Star switched 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. Unlike traditional shared-bus technology, the Hi-Star internal switched architecture lets you add capacity without affecting performance. This means faster information access and faster conversion of information to knowledge that you can act on. And, more time for you to make decisions.

Cost of Risk and ROI Analysis: the reality check managers appreciate

Our Professional Services consultants can work with your business continuity planners to fully exploit the capabilities of the Lightning 9980V and Lightning 9970V storage systems. Our Cost of Risk Analysis and ROI methodology can help to identify the cost, benefit, ROI, and TCO in your information technology infrastructure. This allows you to reduce outage windows and their impact on your business, while you fine-tune your operations strategy. Our recommendations are aligned with your business objectives and presented in terms that you can take to your executive team.

Experience peace of mind with Hitachi Data Systems at your side. After installing your Lightning 9900 V Series system, we monitor it from our support center and handle routine system maintenance to keep it running at maximum efficiency. And you will continue to have rapid access to our time-honored service and support team throughout the life of your Hitachi Freedom Storage investment.

Technical Specifications

SYSTEM CAPACITY

	Lightning 9980V	Lightning 9970V
Number of disk drives (with spares)	5 to 1024	5 to 128
Disk Capacity (GB)		
15,000RPM	36	36
10,000RPM	73	73
7.200RPM	181	181
Total raw capacity per system	74.7TB	9.3TB
Maximum usable capacity for RAID-5		
Open Systems	64.3TB	6.8TB
S/390-compatible	61.1TB	6.4TB
Maximum usable capacity for RAID-1+		
Open Systems	37TB	4.5TB
S/390-compatible	34.6TB	4.2TB
Maximum number of RAID		
groups/system	254 (with 8 spares) 252 (with 16 spares)	31 (with 4 spares)
Data Cache		
Maximum	64GB	32GB
Minimum	4GB	2GB
Increments	4GB	2GB
Control Memory		
Maximum	3GB	3GB
Minimum	2GB	2GB
Logical Device Support	Up to 8,192	Up to 8,192

CONTROL FRAME

CLIENT-HOST CHANNEL ADAPTERS (CHAS)	Lightning 9980V	Lightning 9970V
Number of CHIP pairs	Up to 4	Up to 3
Simultaneous data transfers per CHIP pair	8	8
Physical interfaces per CHIP pair	8	8
Physical Interfaces per System		
Maximum	32	24
FICON	0, 8, 16, 24, 32	0, 8, 16, 24
Extended Serial Adapters℠†	0, 8, 16, 24, 32	0, 8, 16, 24
Fibre Channel (fiber-optic cable)	0, 8, 16, 24, 32	0, 8, 16, 24
Interface Speed (Fibre Channel)	2Gb/sec	2Gb/sec
Logical Paths per System		
Extended Serial Adapters	Up to 8,192	Up to 6,144

ARRAY CONTROL PROCESSOR (ACP)	Lightning 9980V	Lightning 9970V
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 switched architecture		
Aggregate bandwidth (data)	10.6GB/sec	5.3GB/sec
Aggregate bandwidth (control)	5.3GB/sec	2.6GB/sec

ARRAY FRAME

	Lightning 9980V	Lightning 9970V
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	Lightning 9980V	Lightning 9970V
	CONTROL FRAME	INTEGRATED CONTROL AND ARRAY FRAME
Height	1,860mm (73.2 in.)	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*	4.87kVA***
	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 MAGNETORESISTIVE) HEAD TECHNOLOGY	73GB	36GB
Rotation Speed	10,025RPM	14,904RPM
Form Factor	3.5-inch LP	3.5-inch LP
Media Diameter	3.0 in.	2.5 in.
Actuator	Rotary	Rotary
Servo System	Digital	Digital
INTERFACE	FC-AL	FC-AL
Internal Transfer Rate		
Inner Zone	44.2MB/sec	68.5MB/sec
Outer Zone	74.0MB/sec	88.3MB/sec
Average Seek Time		
Read	4.9ms	3.8ms
Write	5.7ms	4.2ms

Hitachi Freedom Storage Software

HITACHI FREEDOM STORAGE SOFTWARE

STORAGE AREA MANAGEMENT SUITE
Hitachi HiCommand Management Framework
Hitachi Resource Manager
  Hitachi Graph-Track
  Hitachi FlashAccess
  Hitachi Virtual Logical Volume Image
    (VLVI) Manager
  Hitachi LUN Manager
  Hitachi SANtinel
Hitachi Command Control Interface
Sun StorEdge Resource Management Suite
VERITAS Volume Manager

BUSINESS CONTINUITY SUITE
Hitachi TrueCopy
NanoCopy
Hitachi ShadowImage
Hitachi Extended Remote Copy (HXRC)
Hi-Track
Hitachi Dynamic Link Manager
Hitachi Parallel Access Volume (HPAV)/Multiple Allegiance (MA)
Geographically Dispersed Parallel Sysplex (IBM)
Hitachi SplitSecond Solutions
Data Protection Services

BACKUP AND RECOVERY SUITE
Hitachi Multiplatform Backup/Restore (HMBR)
Hitachi e-Copy
VERITAS NetBackup
Tantia Technologies HARBOR Backup

PERFORMANCE ENHANCEMENT SUITE
Hitachi CruiseControl
Hitachi Priority Access
Hitachi FlashAccess
Hitachi Parallel Access Volume (HPAV)/Multiple Allegiance (MA)
Hitachi Graph-Track
Hitachi Dynamic Link Manager
Performance Maximizer Package
  Hitachi Performance Monitor
  Hitachi CruiseControl
  Hitachi Priority Access

DATA MOVEMENT SUITE
Hitachi RapidXchange
Data Protection Services
Tantia Technologies HARBOR File Transfer

OPERATING SYSTEM SUPPORT

OPEN SYSTEMS
HP (Compaq) Tru64 UNIX
HP-UX
IBM AIX
Novell NetWare
Linux
IBM (Sequent) DYNIX/ptx
SGI IRIX
Sun Solaris
Windows 2000
Windows NT
HP (Compaq) OpenVMS

S/390
OS/390
MVS/ESA
MVS/XA
TPF/MPLF
VM/ESA
VM/XA
VM/HPO
VSE/ESA
VSE/SP (4.1)
TPF

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† Extended Serial Adapters are compatible with ESCON protocol.

* 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.

♦ Up to six Lightning 9960 frames can be attached to a Lightning 9980V control frame.

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
AIX	HACMP™	Hitachi Dynamic Link Manager
Windows NT/2000	MSCS	Hitachi Dynamic Link Manager
HP (Compaq) Tru64 UNIX	TruCluster	LMS
Sequent	ATAP	IBM (Sequent)
		proprietary software
HP (Compaq) OpenVMS		
Linux		

Superlative Service and Support—Ranked Number One

When you partner with Hitachi Data Systems, we're with you every step of the way. Our service and support teams provide expert consultation—backed by comprehensive assessment, planning, and implementation services—to help you develop your enterprise information strategies and deploy your systems. In fact, respondents to a recent survey by FIND/SVP placed Hitachi Data Systems *Number One in overall service and support as well as technical performance.*

Hitachi TrueNorth™—the Direction You Can Trust

Information and knowledge are fundamental determinants for success in the global economy. Thus, the standards for storage infrastructure availability, performance, scalability, and manageability continue to rise. Hitachi TrueNorth™ is our response to the ensuing demand, allowing you to simplify, protect, and optimize your information infrastructure, reducing total cost of ownership and ensuring a more rapid return on investment.

The Hitachi TrueNorth vision and strategic direction, along with an associated product road map, anticipate customer needs. We view the future storage infrastructure as a synergistic combination of management software and powerful, intelligent storage systems that will deliver set-and-forget management, complemented by flexible capacity, performance, and connectivity.

Prepare for the future with Hitachi. As we move forward, we offer you an open and collaborative storage management framework, policy-based automation tools, virtualization capabilities, and the world's finest storage systems.
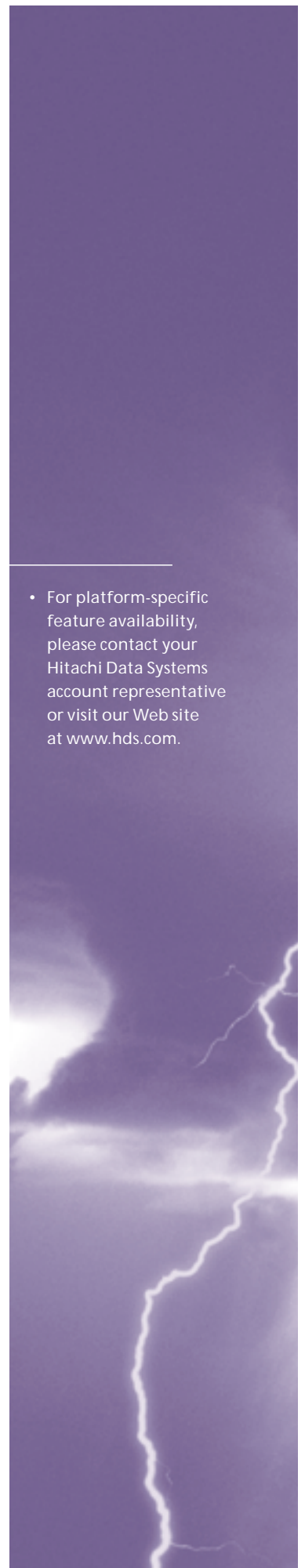
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