



Highlights

- Increase usable capacity per rack typically to one petabyte or more with IBM® Real-time Compression™,¹ greatly reducing effective cost per capacity
 - Meet SLAs with consistent, tuning-free high performance and grid architecture-based linear scaling
 - Slash storage administration time with world-class simplicity and hyper-scale management of up to 144 frames
 - Maintain business continuity with three-site mirroring, full redundancy, self-healing and fast rebuild speed
 - Deploy on/off-premises disaster recovery and other solutions in a unified management environment built with IBM Spectrum Accelerate™
-

IBM XIV Storage System

Cost-saving enterprise storage primed for cloud and built with IBM Spectrum Accelerate software

IBM XIV® Storage System is a high-end data storage system built to deliver out-of-the-box performance predictability, high resiliency and management simplicity while offering exceptional data economics, including savings through powerful real-time compression.

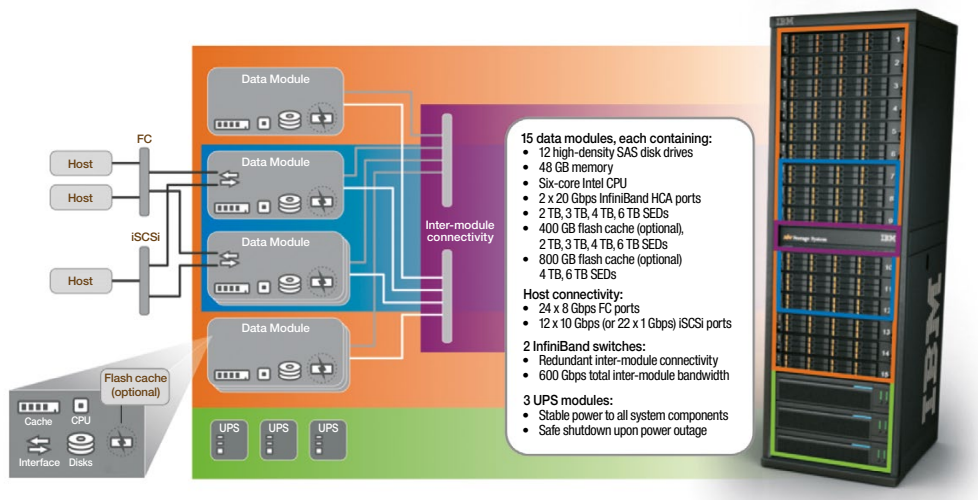
Born for consistent high performance

XIV Storage System delivers hotspot-free, consistent high performance to all applications at all times, tuning-free—even during peak load periods, maintenance and disk recovery—due to several architectural features:

- **Massive parallelism:** XIV uses a distributed design of interconnected modules, each with multi-core CPU, cache, flash caching (optional) and high-density disk drives working in parallel to serve data efficiently.
- **Distributed data:** The system stores data by dividing it into 1 MB partitions, each mirrored to another module; a pseudo-random distribution algorithm spreads the partitions automatically and uniformly across all the disks.
- **Distributed cache:** A flexible and powerful cache implementation allows XIV storage to leverage large slots for reads while managing a smaller slot size, resulting in a superior cache hit ratio and better performance.



- **Flash caching (optional):** XIV deploys flash as a cache across all volumes and without the need to manage tiers. The flash drives cache the most frequently accessed data, boosting performance by up to 4.5 times.²
- **Smart scaling:** Any capacity increase via added modules provides a corresponding increase in processing power, cache, flash caching (optional) and connectivity, for consistent high performance as the system scales.
- **Load balancing:** The system automatically balances application load across all modules uniformly; doing so helps prevent many performance and reliability risks that can plague traditional clustered controller designs.
- **Hotspot-free:** Changes to the application or its I/O pattern do not affect system performance. As workloads change and evolve, the system stays hotspot-free.
- **High bandwidth:** Inter-module communication is over an internal, redundant InfiniBand network equipped with massive bandwidth. Each module has very large CPU-to-memory and disk-to-memory bandwidth.
- **Huge resources:** Each module has its own multi-core processor—90 CPU cores per frame. XIV applies this vast processing power to support small cache slots, ensuring high performance.



XIV Storage System—components and connectivity

XIV is ideal for cloud: Infrastructure matters

- **Simplicity:** Autonomic data distribution, tuning-free high performance, easy capacity planning and multi-tenant administration; acquisition flexibility; no hidden costs
 - **Resiliency:** Grid-scale redundancy; fast disk rebuilds; uninterrupted data access; data-at-rest encryption
 - **Predictability:** Grid design that supports service level agreements (SLAs) through optimal resource sharing and high input/output (I/O) predictability without logical unit numbers (LUNs) configuration
-

Built for enterprise availability

XIV offers field-proven five-nines availability and is designed for continuous operation without interruption to data access:

- **Redundancy:** Full active-active N+1 redundancy of all key components—disks, modules, switches, host connectivity and uninterruptible power supply (UPS) units; hot-swappable
- **High availability and disaster recovery:** Asynchronous mirroring; synchronous mirroring including offline initialization; three-site mirroring with concurrent, synchronized copies of data
- **Encryption:** Data-at-rest encryption; self-encrypting hard drives (SEDs); nondisruptive hot-encryption in minutes
- **World-class rebuild speed:** A 6 TB drive rebuilds in less than an hour on average, as XIV uses all disks at once—and even uses spare system resources upon detecting I/O idle time—and rebuilds written data only
- **Preventive health:** Continuous monitoring of components, with self-healing activated as needed; returns to full redundancy without human intervention
- **Smart maintenance and hot upgrades:** Live maintenance to avoid downtime planning; nondisruptive software upgrades; disk/module maintenance when data is fully redundant

- **Reliable backup and recovery:** Host-based application programming interfaces; Microsoft Windows Volume Shadow Copy Service support; fast, application-aware backup and restore with IBM Spectrum Control™; near-instant space-efficient snapshots with IBM Spectrum Protect™

Designed for easily managed scalability

The XIV system is designed for simple Tier 1 storage administration, with centralized management, exceptional data mobility, load balancing and over-provisioning across up to 144 XIV arrays. It features a very easy-to-use graphical user interface (GUI), with management tools, hyper-scaling, and compression prediction built in. The underlying architecture requires little training or expertise and redistributes data automatically as new modules are added. XIV compression requires no added hardware, enabling a software alternative to hardware-based capacity scaling.

Exceptional data economics

Real-time compression, use of very high-density drives, space reclamation capabilities, ease of use, ENERGY STAR certification and flexible licensing options help make XIV an industry leader in economics value.

- **Inline compression:** XIV uses field-proven IBM Random Access Compression Engine (RACE) technology, effectively increasing usable capacity per rack to one petabyte or more¹ without requiring acceleration hardware:
 - Leverages the XIV grid architecture to scale performance and simplify compression management
 - Replicates compressed data faster and while using less bandwidth, freeing up bandwidth for other uses
 - Continuously displays predicted or actual compression ratios for all volumes
 - Converts non-compressed volumes to compressed volumes nondisruptively

- **World-class ease of use:** Time saved is money saved. XIV users provision data by simply sizing volumes. LUN mapping is drag and drop. Workloads are ingested without need for I/O analysis or performance tuning. Snapshots and test environments are differential, created in seconds. Data migration is fast, and remote mirroring is easy and across generations. A mobile dashboard offers “anywhere, anytime” real-time notifications and system monitoring.
- **Easy acquisition:** XIV system software includes all functionality ready for use—with the exception of compression, which involves a separate license. The XIV Cloud Storage for Service Providers product offers a flexible choice of features. [IBM Advanced System Placement program](#) offers subsequent XIV systems at near-zero upfront-cost, with the balance paid upon reaching a pre-set capacity.

Effortless integration across host platforms

XIV integrates with leading platforms—at no extra cost.

- **Operating systems:** VMware ESXi, Windows, IBM AIX®, Red Hat Enterprise Linux Server, SUSE Linux Enterprise Server, Solaris, HP-UX and IBM iSeries® (via VIOS)
- **IBM platforms:** VIOS for IBM Power Systems™ (IBM System i® and IBM System p®); IBM PowerVM®; IBM i5/OS® v6R1; AIX (and IBM AIX Multiple Path I/O [MPIO] driver); IBM PowerHA® (HACMP™); and IBM Spectrum Control
- **Integrated storage solutions:** File-protocol access capabilities with IBM Spectrum Scale™, storage virtualization across heterogeneous systems with IBM Spectrum Virtualize™ and deduplication archiving with IBM Spectrum Protect and IBM Spectrum Archive™
- **Multipath support:** Native operating system multipathing solutions, Symantec Veritas Storage Foundation dynamic multipathing (DMP)³ and EMC PowerPath³

IBM Spectrum Accelerate

IBM XIV Storage System is built using IBM Spectrum Accelerate, a software-defined storage solution that delivers proven enterprise-class capabilities including performance predictability, ease of use, and an advanced management toolset. IBM Spectrum Accelerate offers rapid deployment, extreme agility and cost effectiveness for addressing application workload demands, and can reduce procurement needs and enable standardization of storage operations and services. Use cases include flexible deployment of on- and/or off-premises storage solutions such as hybrid clouds, disaster recovery for remote branch offices and on-demand test/development environments. IBM Spectrum Accelerate software is available pre-installed in IBM XIV Storage System, or for deployment on hardware of choice or in the IBM SoftLayer⁴ cloud.

Enterprise-proven features and solutions

XIV integrates with leading platforms—at no extra cost.

- **Advanced features:** XIV offers enterprise-class features with the system software at no extra cost, including mirroring, advanced snapshot management and multi-tenancy. For a full list, go to ibm.com/xiv.
- **Cloud and virtualization:** OpenStack Cinder for automation; RESTful API for customization; XIV storage self-provisioning via IBM Cloud Storage Access and via PowerVC for IBM Power® environments; deep integration with VMware and Microsoft management systems and hypervisors; full compliance with other virtualization environments, including Citrix XenServer, IBM z/VM® and VIOS for Power Systems

- **Broad, hotspot-free VMware solutions set:** Using IBM Spectrum Control and a VMware vSphere Web Client plug-in: high-end virtual machine-granular storage with VMware vSphere Virtual Volumes (VVOL)⁵; storage control with vSphere APIs for Storage Awareness (VASA); cloud automation/monitoring with VMware vRealize Suite; optimization and space reclamation with vStorage APIs for Array Integration (VAAI); IBM-native storage visibility and self-service provisioning. XIV supports certified disaster recovery with VMware Site Recovery Manager (SRM) and backup/restore of vSphere virtual machines using IBM Spectrum Protect and vStorage APIs for Data Protection (VADP)
- **Efficient, hotspot-free Microsoft solutions:** Automation of clouds and virtualized environments using Hyper-V and Microsoft System Center Virtual Machine Manager (SCVMM) with certified Storage Management Initiative Specification (SMI-S) support; seamless replication orchestration with SCVMM and Microsoft Azure Site Recovery; XIV monitoring with IBM Storage Management for Microsoft System Center Operations Manager (SCOM); Windows Server 2012 R2 and Windows Server 2012 certification and space reclamation; Microsoft Windows VSS provider; Microsoft Failover Clustering agent
- **Business applications:** Consistent high performance for IBM Notes®, Microsoft Exchange, Solaris, SAP, SAS and healthcare applications such as Epic
- **Extended storage management:** IBM Spectrum Control, SCVMM, HP Storage Essentials and Symantec Veritas Storage Foundation
- **Data protection and business continuity:** Backup solutions with IBM Spectrum Control, IBM Spectrum Protect, Symantec NetBackup and CommVault Simpana IntelliSnap; disaster-recovery solutions with PowerHA, Symantec Veritas Cluster Server (VCS), VMware SRM, Microsoft Azure Site Recovery and Microsoft Failover Clustering

IBM XIV Storage System (Model 2810/2812-214)—capacity and connectivity

Number of frames/modules	Number of disks	Usable capacity (TB, decimal) 1 TB*/ 2 TB/3 TB/4 TB/6 TB	Fibre Channel ports 8 Gbps	iSCSI ports 1 or 10 Gbps
1/6	72	28/55/84/112/169	8	6 or 4
1/9	108	44/88/132/177/267	16	14 or 8
1/10	120	51/102/154/207/311	16	14 or 8
1/11	132	56/111/168/225/338	20	18 or 10
1/12	144	63/125/190/254/382	20	18 or 10
1/13	156	67/134/203/272/409	24	22 or 12
1/14	168	75/149/225/301/453	24	22 or 12
1/15	180	80/161/243/325/485	24	22 or 12
144† / 2,160	25,920	69,840	3,456	3,168 or 1,728

IBM XIV Storage System (Model 2810/2812-214)—number of CPUs and memory					
Number of frames/modules	Number of disks	Number of CPUs	XIV memory (GB) 24 GB / 48 GB per module	Flash caching (TB) (optional)	
				1 TB,* 2 TB, 3 TB capacity points (400 GB per module)	4 TB and 6 TB capacity points (400 GB or 800 GB per module)
1/6	72	6	144/288	2.4	2.4 or 4.8
1/9	108	9	216/432	3.6	3.6 or 7.2
1/10	120	10	240/480	4.0	4.0 or 8.0
1/11	132	11	264/528	4.4	4.4 or 8.8
1/12	144	12	288/576	4.8	4.8 or 9.6
1/13	156	13	312/624	5.2	5.2 or 10.4
1/14	168	14	336/672	5.6	5.6 or 11.2
1/15	180	15	360/720	6.0	6.0 or 12.0
144 [†] / 2,160	25,920	2,160	51,840/103,680	864	864.0 or 1,728.0

IBM XIV Storage System (Model 2810/2812-214)—power usage (typical)			
Number of frames/modules	Number of disks	1 TB*/2 TB/3 TB/4 TB/6 TB kVA	
		Without flash caching	With flash caching
1/6	72	2.4/2.4/2.5/2.5/2.5	2.5/2.5/2.6/2.6/2.6
1/9	108	3.5/3.5/3.7/3.8/3.8	3.6/3.6/3.8/3.9/3.9
1/10	120	3.9/3.9/4.1/4.2/4.2	4.0/4.0/4.2/4.3/4.3
1/11	132	4.2/4.2/4.4/4.5/4.5	4.3/4.3/4.5/4.6/4.6
1/12	144	4.6/4.6/4.8/4.9/4.9	4.7/4.7/4.9/5.0/5.0
1/13	156	4.9/4.9/5.2/5.3/5.3	5.0/5.0/5.3/5.4/5.4
1/14	168	5.3/5.3/5.5/5.6/5.6	5.5/5.5/5.7/5.8/5.8
1/15	180	5.6/5.6/5.9/6.0/6.0	5.8/5.8/6.1/6.2/6.2

IBM XIV Storage System (Model 2810/2812)—System specifications

General properties

Capacity per drive (nearline SAS)	1 TB,* 2 TB, 3 TB, 4 TB or 6 TB self-encrypting hard drives (SEDs)
Number of disk drives (min/max)	72/180
Encryption	All disk drives are SEDs. When encryption is enabled, the data on the flash drives is also encrypted. XIV encryption requires an external key management solution, such as IBM Security Key Lifecycle Manager.
Data reduction using IBM Real-time Compression	Provides up to five times the capacity per compressed volume

Performance features

Maximum number of CPUs	15 Intel Xeon Processor E5645
Maximum number of CPU cores	90 physical (180 logical cores with Intel Hyper-Threading technology)
Maximum memory	Up to 360 GB (24 GB of memory per module)—1 TB,* 2 TB or 3 TB capacity points Up to 720 GB (48 GB of memory per module)—4 TB or 6 TB capacity points
Maximum cache-to-disk bandwidth	480 Gbps
Flash caching (optional)	Up to 6 TB (400 GB flash caching per module)—all capacity points Up to 12 TB (800 GB flash caching per module)—4 TB or 6 TB capacity points

Physical features

Temperature	10°C – 35°C (50°F – 95°F)
Altitude (max)	2,134 m/7,000 ft
Humidity	25% – 80% noncondensing
Dimensions (height × width × depth)	202 cm × 66 cm × 120 cm (79.53 in. × 25.98 in. × 47.24 in.)
Maximum weight	1,041.5 kg (2,296 lb)
Clearance front/rear	120 cm/120 cm (47.24 in./47.24 in.)
Redundant power feed	√
Input voltage	180 – 264 V ac at 60 A or 30 A (±10%)

Host connectivity

Fibre Channel rates	8 Gbps
iSCSI rates	1 Gbps or 10 Gbps
Capacity-on-demand configurations	√
Warranty	1 and 3 year limited warranty, onsite service, same day 24×7

For more information

To learn more about IBM XIV Storage System, contact your IBM representative or IBM Business Partner, or visit:

ibm.com/xiv

Additional online resources:

- [SPC-1 benchmark results](#)
- [SPC-2/E benchmark results](#)
- 2013 Microsoft [ESRP](#) benchmark results
- IBM Redbooks: [XIV Storage System: Architecture and Implementation](#)
- IBM Redbooks: [XIV and IBM Real-time Compression](#)
- IBM Redbooks: [XIV Storage System: IBM Hyper-Scale Mobility Overview and Usage](#)
- [IBM System Storage Interoperation Center \(SSIC\)](#)
- [IBM ISV Solutions Resource Library](#)
- [Search for XIV on IBM Techdocs library](#)
- [White paper on XIV and Virtual Volumes](#)
- [White paper on IBM Spectrum Accelerate](#)
- [Advanced System Placement program for IBM XIV](#)

* System utilizing 1 TB per disk capacity

[†] Maximum managed capacity with IBM Hyper-Scale – up to 144 XIV frames, with 15 modules each

¹ Based on using a 15-module system with 6 TB disk drives.

² For database-like workloads. All performance data contained in this publication was obtained in an IBM lab environment under simulated conditions and is presented as an illustration. Performance obtained in other operating environments may vary, and customers should conduct their own testing.

³ For latest support details, check with the vendor.

⁴ SoftLayer Technologies was acquired by IBM in July of 2013.

⁵ IBM Spectrum Control with VASA 2.0 support.



© Copyright IBM Corporation 2015

IBM Systems
Route 100
Somers, NY 10589

Produced in the United States of America
May 2015

IBM, the IBM logo, ibm.com, System Storage, IBM Spectrum Accelerate, IBM Spectrum Archive, IBM Spectrum Control, IBM Spectrum Protect, IBM Spectrum Scale, IBM Spectrum Storage, IBM Spectrum Virtualize, XIV, Real-time Compression, Power, Power Systems, PowerHA, and PowerVC are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at “Copyright and trademark information” at ibm.com/legal/copytrade.shtml

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both

This document is current as of the initial date of publication and may be changed by IBM at any time. Not all offerings are available in every country in which IBM operates.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary. It is the user’s responsibility to evaluate and verify the operation of any other products or programs with IBM products and programs. THE INFORMATION IN THIS DOCUMENT IS PROVIDED “AS IS” WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY OR CONDITION OF NON-INFRINGEMENT. IBM products are warranted according to the terms and conditions of the agreements under which they are provided.

The client is responsible for ensuring compliance with laws and regulations applicable to it. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the client is in compliance with any law or regulation. Statements regarding IBM’s future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Actual available storage capacity may be reported for both uncompressed and compressed data and will vary and may be less than stated.



Please Recycle