



Highlights

- Increase effective capacity per rack typically to one PB or more with IBM® Real-time Compression™,¹ greatly reducing effective cost per capacity
 - Consistently meet service level agreements (SLAs) with tuning-free, predictable 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™
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IBM XIV Storage System

Capacity-optimized enterprise storage primed for cloud solutions and built with IBM Spectrum Accelerate software

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

Born for consistent high performance

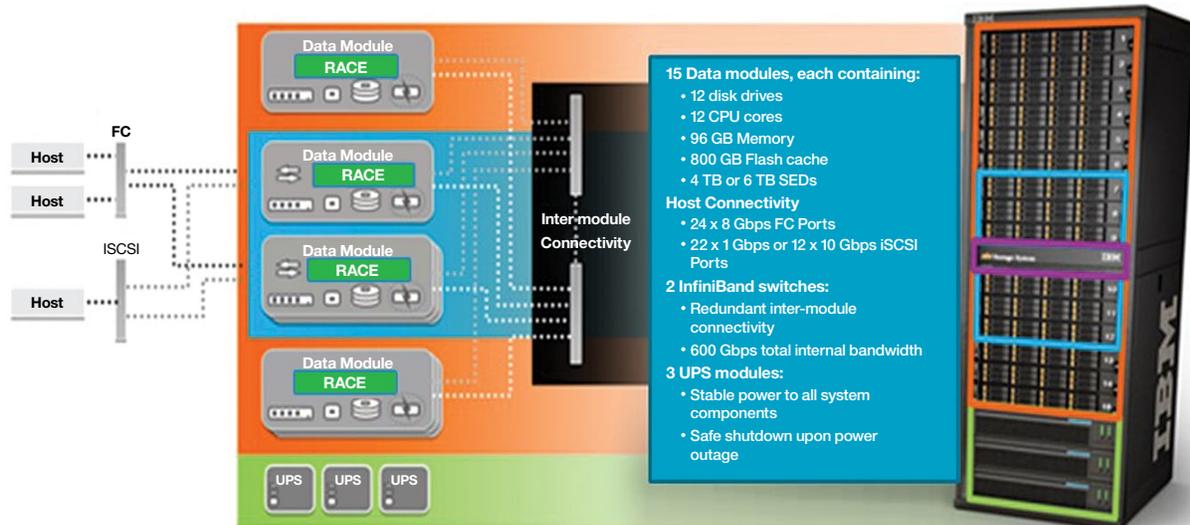
XIV Storage System delivers hotspot-free, consistent high performance to all applications at all times, tuning-free—even during peak load periods, maintenance and disk recovery—due to several architectural features:

- **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.



IBM Systems Data Sheet

- **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 input/output (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 six-core processor—180 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:

- **Capacity:** Up to 2 PB of effective capacity per system and 288 PB with hyper-scale management of 144 systems; XIV dramatically reduces total cost of ownership by increasing the effective capacity while providing cost savings on physical space, power consumption and related administrative costs
 - **Predictability:** Grid architecture that supports SLAs through optimal resource sharing and high I/O predictability without the need for complex analysis or performance tuning
 - **Simplicity:** Autonomic data distribution, tuning-free high performance, easy capacity planning and multi-tenant administration; acquisition flexibility; no hidden costs
 - **Resiliency:** Grid redundancy; fast disk rebuilds; uninterrupted data access; data-at-rest encryption
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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

- **High 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; nondisruptive addition of new modules to scale up XIV capacity
- **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™
- **Compression:** Nondisruptive conversion of any volume from a non-compressed state to a compressed state, or vice-versa

Designed for easily managed scalability

The XIV system is designed for simple enterprise 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 and redistributes data automatically as new modules are added.

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 economic value.

- **More capacity:** From 1 PB to 2 PB of enterprise storage under 1 USD per GB of effective capacity,⁶ guaranteed, and up to 288 PB with hyper-scale management of 144 systems.
- **Inline compression:** XIV uses field-proven IBM Random Access Compression Engine (RACE) technology, effectively increasing usable capacity per rack to one PB or more¹ without requiring acceleration hardware:
 - Leverages the XIV grid architecture to scale compression performance and simplify compression management
 - Replicates compressed data faster, hence using less bandwidth, freeing up bandwidth for other uses
 - Continuously displays predicted or actual compression ratios for all volumes
 - Converts non-compressed to compressed volumes nondisruptively
- **Ease of use:** Compressing data has never been so easy; enabled by default, XIV volumes are compressed, and do not require continuous monitoring or any tuning.
- **Time savings:** Time saved is money saved. XIV users provision data by simply sizing volumes. Logical unit number (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. The IBM XIV Cloud Storage for Service Providers product offers a flexible choice of features. [The 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, Microsoft Hyper-V, Microsoft Windows Server, 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

Based on proven IBM XIV Storage System technology, IBM Spectrum Accelerate is 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; reduces procurement needs; and enables 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 XIV, 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; representational state transfer (REST) application programming interface (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 and easy to automate 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 VMware vSphere APIs for Storage Awareness (VASA); cloud automation/monitoring with VMware vRealize Suite; optimization and space reclamation with VMware vStorage APIs for Array Integration (VAAI); and 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 VMware vStorage APIs for Data Protection (VADP)
- **Efficient, hotspot-free and easy-to-automate 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 Systems
Data Sheet

IBM XIV Storage System (Model 2810/2812-314)—capacity and connectivity

Number of modules	Number of disks	Capacity (TB, decimal) 4 TB/6 TB	Effective capacity* (TB decimal) 4 TB/6 TB	Fibre Channel ports 8 Gbps	iSCSI ports 1 or 10 Gbps
9	108	177/267	354/534	16	14 or 8
10	120	207/311	414/622	16	14 or 8
11	132	225/338	450/676	20	18 or 10
12	144	254/382	508/764	20	18 or 10
13	156	272/409	544/818	24	22 or 12
14	168	301/453	602/906	24	22 or 12
15	180	325/485	650/970	24	22 or 12

IBM XIV Storage System (Model 2810/2812-314)—number of CPUs and memory

Number of modules	Number of disks	Number of CPUs	Memory (GB) 96 GB per module	Flash caching (TB) 800 GB per module
9	108	18	864	7.2
10	120	20	960	8.0
11	132	22	1,056	8.8
12	144	24	1,152	9.6
13	156	26	1,248	10.4
14	168	28	1,344	11.2
15	180	30	1,440	12.0

IBM XIV Storage System (Model 2810/2812-314)—power usage (typical)

Number of modules	Number of disks	kVA
9	108	4.7
10	120	5.1
11	132	5.5
12	144	6.0
13	156	6.5
14	168	7.0
15	180	7.5

IBM Systems
Data Sheet

IBM XIV Storage System (Model 2810/2812-314)—System specifications

General properties

Capacity per drive (nearline SAS)	4 TB or 6 TB SEDs
Number of disk drives (min/max)	108/180
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.

Hardware features

Number of CPUs (min/max)	18/30 Intel Xeon Processor E5645
Number of CPU cores (min/max)	108/180
Memory (min/max)	864 GB/1,440 GB
Maximum cache-to-disk bandwidth	480 Gbps
Flash caching (min/max)	7.2 TB/12 TB

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	1,044.5 kg (2,303.1 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

Ordering options

Capacity-on-demand configurations	√
Warranty	1 and 3 year limited warranty, on-site 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:

- General online resources: ibm.com/xiv
- 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 \(SSIC\)](#)
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- [Search for XIV on IBM Techdocs library](#)
- [White paper on IBM Spectrum Accelerate](#)
- [Advanced System Placement program for IBM XIV](#)

* The effective capacity is the amount of storage that can be allocated to applications via XIV volumes and snapshots with IBM XIV Gen3 model 314. The effective capacity values in this table are based on a 2x compression ratio.

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.

⁶ The effective capacity is the amount of storage that can be allocated to applications via XIV volumes and snapshots with IBM XIV Gen3 model 314. The effective capacity values in this table are based on a 2x compression ratio.



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



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