IBM XIV Storage System Gen3

A capacity-optimized storage solution with grid architecture and powerful cloud capabilities

Highlights

- Increase effective capacity per rack up to 2 PBs with IBM® Real-time Compression™,[1] greatly reducing effective cost per capacity
- Deliver enterprise-class storage capabilities with consistent, predictable performance to diverse workloads
- Scale storage management to 288 PBs of effective capacity across hybrid clouds
- Deliver mature enterprise features and management tools at no extra charge
- Protect data with cost-effective disaster recovery, multi-tenancy, quality of service and security features

IBM XIV® Storage System is a capacity-optimized enterprise-class block storage solution built to deliver predictable service levels to a diverse workload mix, high resiliency and management simplicity while offering exceptional data economics, including more effective capacity through powerful real-time compression.

Optimized capacity

XIV delivers up to 2 PB of effective capacity per system and 288 PB with hyper-scale management of 144 systems. XIV can dramatically reduce the total cost of ownership by increasing the effective capacity while providing cost savings on physical space, power consumption and related administrative costs.

Powerful cloud capabilities

Cloud computing imposes important business challenges for both client companies and cloud service providers, both of whom need to meet strict system requirements to really take advantage of cloud benefits. These demands include faster application deployment, quick response to unpredictable business workload changes and the ability to maintain consistent performance across private, public and hybrid environments—all while avoiding complex analysis or performance tuning. And they must achieve these goals at the same time they are facing pressures to minimize capital and operating costs.

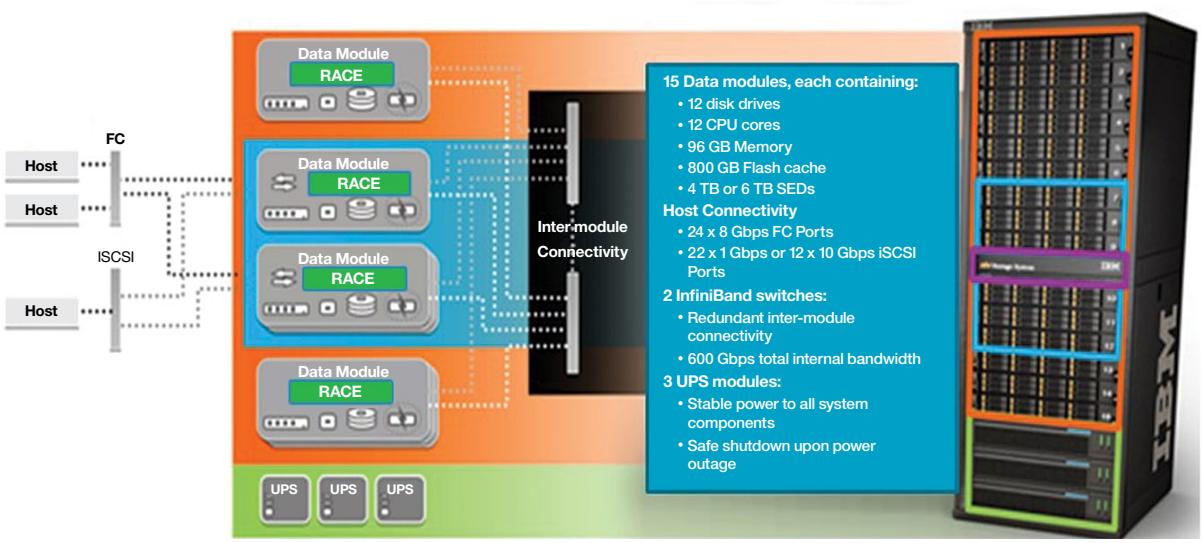
IBM XIV Storage System Gen3 can help speed and empower your cloud deployment in a number of ways:

Predictable and consistent performance: The XIV grid design helps deliver predictable, consistent service levels at all times to a diverse workload mix without the need for complex analysis or performance tuning even during peak load periods, maintenance and disk recovery.

Simplified management: XIV simplifies and standardizes storage management across private, public and hybrid cloud environments through world-class ease of use and built-in IBM Hyper-Scale technologies. The system enables users to scale storage management with minimal overhead and training.

Enterprise availability: With better than five-nines availability, XIV supports continuous operations through self-healing, world-class disk rebuild technology and robust quality of service.

All-inclusive capabilities: XIV delivers mature, built-in enterprise features and management tools at no extra charge, including remote replication, snapshots, multi-tenancy, advanced quality of service, monitoring and security. It offers automation and orchestration through support for the OpenStack cloud operating system, Representational State Transfer (REST) and VMware technologies.



XIV Storage System—components and connectivity

Cloud deployment and virtualization: XIV supports OpenStack Cinder for automation; REST application programming interface (API) for customization; 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; and full compliance with other virtualization environments, including Citrix XenServer, IBM z/VM® and VIOS for Power Systems™.

Grid architecture: XIV implements unique grid architecture of interconnected modules, each with its own six-core processor, cache, flash caching and high-density disk drives working in parallel to serve data and efficiently ensuring tuning-free predictable and consistent performance to all applications at all times—even during peak load periods, maintenance and disk recovery. XIV accomplishes this by using several architectural features:

- **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:** 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 and connectivity, for consistent 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 design:** 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.

Extraordinary simplicity

The simplicity of XIV management enables effective administration of enterprise-scale storage capacities at a fraction of the staffing and training requirements of traditional storage systems. The XIV grid architecture provides advanced data distribution and self-healing capabilities that eliminate the need for planning and complex administration required by traditional systems.

Tasks related to group administration, volume and snapshot allocation, spare capacity setup, system performance optimization, tiering, and recovery procedures have been removed from XIV system management requirements. This reduction in complexity coupled with the solution's clean and intuitive graphical user interface (GUI) make XIV an industry leader in management simplification.

Built for enterprise availability

XIV offers field-proven five-nines availability[3] 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

Effortless integration across host platforms

XIV integrates with leading platforms—at no extra cost.

- **Operating systems:** VMware ESXi, Microsoft Hyper-V, Citrix XenServer, Microsoft Windows Server, IBM AIX®, Red Hat Enterprise Linux Server, SUSE Linux Enterprise Server, Solaris, HP-UX and IBM iSeries (via VIOS)
- **IBM platforms:** IBM Power Systems; IBM System p5® and older; 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)[4] and EMC PowerPath[4]

IBM Spectrum Accelerate

Based on proven XIV technology, IBM Spectrum Accelerate is a software-defined block storage solution that delivers enterprise-class capabilities including performance predictability, ease of use and an advanced feature toolset. It 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 storage hybrid clouds, disaster recovery for remote branch offices and support for on-demand test/development environments. IBM Spectrum Accelerate can be used on x86 servers, pre-installed third-party appliances or public cloud infrastructure, and as a service on IBM SoftLayer[5] infrastructure. It can be licensed for use on XIV, IBM FlashSystem® A9000 and IBM FlashSystem A9000R—helping you flexibly and cost-effectively meet different needs. All IBM Spectrum Accelerate deployments are managed with IBM Hyper-Scale Manager. IBM Spectrum Accelerate delivers the block storage component of IBM Spectrum Storage™.

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.
- **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)[6]; 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 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 InteliSnap; 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 2810/2812-314)—capacity and connectivity

Number of modules	Number of disks	Effective capacity* (TB decimal) 4 TB/6 TB	Fibre Channel ports 8 Gbps	iSCSI ports 1 or 10 Gbps
9	108	354/534	16	14 or 8
10	120	414/622	16	14 or 8
11	132	450/676	20	18 or 10
12	144	508/764	20	18 or 10
13	156	544/818	24	22 or 12
14	168	602/906	24	22 or 12
15	180	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 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 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

Why IBM?

Innovative technology, open standards, excellent performance, and a broad portfolio of proven storage software and hardware solutions offerings—all backed by recognized industry leadership—are just a few of the reasons to consider storage solutions from IBM. In addition, IBM delivers some of the best storage products, technologies, services and solutions in the industry without the complexity of dealing with different hardware and software vendors.

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)
- IBM ISV Solutions Resource Library
- 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]Based on IBM internal measurements.

[4]For latest support details, check with the vendor.

[5]SoftLayer Technologies was acquired by IBM in July of 2013.

[6] IBM Spectrum Control with VASA 2.0 support.

IBM Systems
Route 100
Somers, NY 10589

Produced in the United States of America
May 2016

TSD03207-USEN-01