VMAX ALL FLASH
All Flash Meets Mission-Critical

ESSENTIALS

- Leverage advanced 3D NAND flash to consolidate high-demand transaction processing workloads

- Achieve consistent <.5ms response times at massive scale for extreme-growth hybrid cloud environments

- Process millions of IOPS at sub-1ms latency using up to 384 CPU cores and multi-threading technology

- Accelerate time to deployment with streamlined appliance packaging

- Protect vital open systems and mainframe information at six-nines availability via SRDF, the gold standard in remote replication

- Create hundreds of snapshots for each workload to optimize decision support, application testing and business analytics with SnapVX

- Deliver rapid backup and restore with EMC ProtectPoint; backup directly from VMAX All Flash to Data Domain, eliminate app server overhead

- Use EMC Unisphere to easily provision, manage, and monitor VMAX All Flash block and file storage

- Leverage Unisphere 360 to track and monitor up to 200 VMAX All Flash arrays from a single screen

- Embed file services and reduce deployment costs by up to 33%

All flash arrays are accelerating the pace of business transformation as IT professionals search for the most relevant technologies to modernize their operation and drive down operational and capital expenditures. As flash prices rapidly decline, capacity points exceed spinning disk, and data reduction techniques advance more organizations are evaluating, testing, and deploying all-flash solutions to tackle the most demanding mixed workloads that span across the modern data center.

The new EMC VMAX All Flash arrays are architected to solve the CIO challenge of embracing a modernized flash-centric data center and hybrid cloud while simultaneously simplifying, automating and consolidating IT operations. VMAX All Flash isn't just bigger, better and faster – which it is – it was engineered for the latest, high density flash technology, but also to specifically exploit the rich set of data services of VMAX All Flash. These data services address the new requirements of the modern data center while continuing to deliver the reliability and availability EMC customers have relied on for years.

EASY
- Easily configure, deploy and manage VMAX All Flash through appliance packaging that pre-configures all hardware and software elements
- 1-click simplified provisioning for open systems, mainframe, IBM i, block and file environments
- Easily monitor and track up to 200 VMAX All Flash arrays in your data center from a single screen with Unisphere 360

SCALABLE
- Leverage advanced multi-core / multi-threading algorithms and a flash-optimized design to meet strict SLAs for high-demand online transaction processing (OLTP), virtualized applications, and high growth Oracle and SQL databases
- Scale out performance and scale up capacity to achieve cloud scale with predictable performance of <.5ms response times

TRUSTED
- Always-on availability architecture with advanced fault isolation, robust data integrity checking, and proven non-disruptive hardware and software upgrades
- Six-nines availability for 24x7xForever operations using SRDF® software, the gold standard for multi-site remote replication

CONSOLIDATION AT CLOUD SCALE

As the industry's most reliable platform for cloud scale consolidation, VMAX All Flash enables organizations to dynamically grow, easily share, and cost-effectively manage massive amounts of open systems and mainframe storage. VMAX All Flash is the leader in maintaining consistently high performance levels while running thousands of mixed workloads concurrently on a single VMAX All Flash array—you'll be able to deliver predictable and responsive service, even at massive scale.
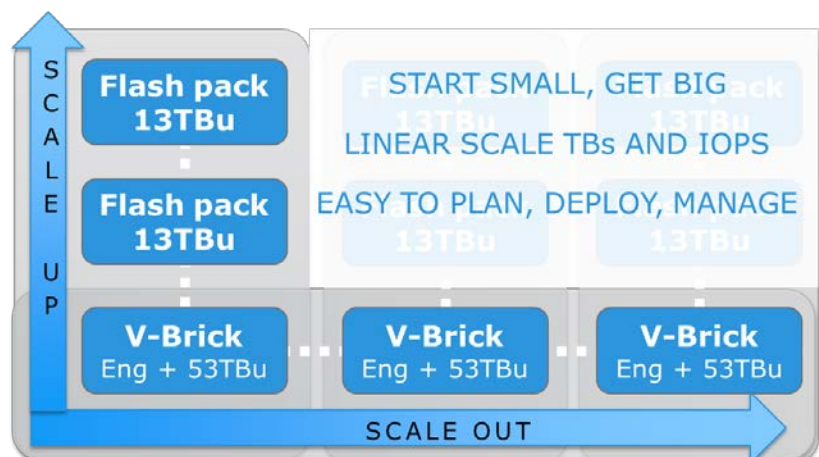

PURPOSE-BUILT FOR EXTREME PERFORMANCE

For enterprises that require petabyte-level scale, the VMAX All Flash is purpose-built to easily manage high-demand, heavy-transaction workloads while storing petabytes of vital data. The VMAX All Flash hardware design features the turbo-charged Dynamic Virtual Matrix Architecture that enables extreme speed and consistent sub-millisecond response time.

The VMAX All Flash architecture can scale beyond the confines of a single system footprint to deliver scalable performance where needed. It enables hundreds of multi-core Intel CPUs to be pooled and allocated on-demand to meet the performance requirements for dynamic mixed workloads. This is achieved though powerful multi-threading and the industry's first dynamic, user controlled core allocation so no workload is starved of resources.

The core element of VMAX All Flash is the V-Brick. Each V-Brick has one engine, two DAEs, and 53TB of usable capacity with fully redundant components. Flash Capacity Packs are used to scale up to 4PB -- each Flash Capacity Pack contains 13TB of usable storage. The VMAX All Flash scales by aggregating up to eight V-Bricks as a single system with fully shared connectivity, processing, and capacity resources. Each   V-Brick supports up to 48 CPU cores for blazing-fast performance scaling to a maximum of 384 cores per array.

STREAMLINED PACKAGING

The VMAX 450F and VMAX 450FX are Tier-1 highly scalable all flash arrays that solve the broadest set of modern storage challenges. The VMAX 450FX includes additional software as shown below.

The world's most powerful all-flash systems are the new VMAX 850F and VMAX 850FX. These new models excel in the most demanding, cloud scale environments that require hyper-consolidation for the modern data center. The VMAX 850FX includes additional software as shown below.

VMAX ALL FLASH SOFTWARE PACKAGES
SOFTWARE THAT SHIPS WITH VMAX 450 AND 850 ARRAYS

"F" PACKAGE
VMAX 450F / VMAX 850F *

- HYPERMAX OS
- Thin Provisioning
- Virtual Volumes
- QOS: Host IO Limits, Service Levels
- Embedded Unisphere, Solutions Enabler, SMI-S
- SnapVX
- AppSync

* Non-disruptive Mobility and In-line Compression available in 2H 2016

"FX" PACKAGE
VMAX 450FX / VMAX 850FX

- All "F" package items, plus:
- D@RE
- SRDF/S, SRDF/A, SRDF 3-site and 4-site
- SRDF/Metro
- Embedded NAS
- Unisphere 360
- CloudArray Enabler
- ViPR Suite (SRM and Controller)

Note: Above software represents open systems configurations.

OPEN EXTENSIBLE HYPERVISOR VIA HYPERMAX

VMAX All Flash leverages the industry's first open storage and hypervisor converged operating system, HYPERMAX OS. It combines industry-leading high availability, I/O management, quality of service, data integrity validation, storage tiering, and data security with an open application platform.
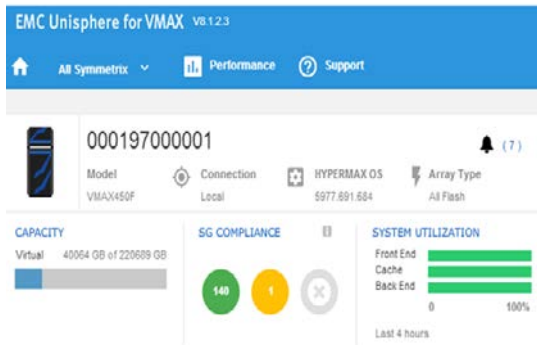
HYPERMAX OS features the first real-time, non-disruptive storage hypervisor that manages and protects embedded services by extending high availability to services that traditionally would have run external to the array. It also provides direct access to hardware resources to maximize performance. The hypervisor can be non-disruptively upgraded.

EMBEDDED MANAGEMENT SAVES TIME & MONEY

Embedded management (eManagement) leverages the HYPERMAX OS hypervisor reducing capital and operational expenses. This feature enables customers to further simplify management, reduce cost, and increase availability by running VMAX All Flash management software directly on the array. Key elements of eManagement include running embedded Unisphere, Solutions Enabler, and SMI-S management software on VMAX All Flash.

UNIFY STORAGE WITH EMBEDDED NAS

VMAX All Flash unified storage introduces embedded file data services that enable customers to consolidate islands of block and file storage, simplify management, and reduce deployment costs by up to 33%. Embedded NAS (eNAS) uses the hypervisor provided in HYPERMAX OS to create and run a set of virtual machines on VMAX All Flash controllers. These virtual machines host two major elements of eNAS: software data movers and control stations and are distributed based on the mirrored pair architecture of VMAX All Flash to evenly consume resources for both performance and capacity. Common eNAS use cases include running Oracle® on NFS, VMware® on NFS, Microsoft® SQL on SMB 3.0, home directories, and Windows server consolidation.

Embedded Data Services

HYPERMAX OS features the first real-time, non-disruptive storage hypervisor that manages and protects embedded storage and application services.

EMC Unisphere:

An intuitive management interface that allows IT managers to greatly reduce the time required to provision, manage, and monitor VMAX All Flash storage.

- More cost-efficient "cold data" storage
- Always-accessible online cloud archive
- Increase VMAX All Flash managed capacity

MANAGEMENT ABSTRACTION FOR SIMPLICITY

EMC Unisphere for VMAX is an intuitive management interface that allows IT managers to maximize human productivity by dramatically reducing the time required to provision, manage, and monitor VMAX All Flash storage assets. Unisphere delivers the simplification, flexibility, and automation that are key requirements to accelerate the transformation to the hybrid cloud. For customers who frequently build up and tear down storage configurations, Unisphere® for VMAX makes reconfiguring the array even easier by reducing the number of steps required to delete and repurpose volumes.

Unisphere 360 software aggregates and monitors up to 200 VMAX All Flash / VMAX arrays across a single data center. This solution is a great option for customers running multiple VMAX All Flash arrays with embedded management (eManagement) and who are looking for ways to facilitate better insights across their entire data center. Unisphere 360 provides storage administrators the ability to view site-level health reports for every VMAX or coordinate compliance to code levels and other infrastructure maintenance requirements. Customers can leverage the simplification of VMAX All Flash management, now at data center scale.

VMWARE VIRTUAL VOLUMES

Not all Virtual Volume (VVol) support is created equal. While VMware Virtual Volumes simplify management and provide per-VM storage control, the revolutionary VMAX All Flash takes VVol integration to a whole new level. Not only was VMAX All Flash designed to support the scale of VVol storage – up to 64,000 virtual volumes today and many more in the future – but the VMAX All Flash management paradigm that has radically simplified storage management realizes the full value of VVol storage polices. VMAX All Flash provides the highest levels of availability, data protection and performance directly to the VM. And, customers can manage VMware storage at a much more granular level (Virtual Machine) providing even greater efficiency.

DYNAMIC HOST I/O LIMITS

VMAX All Flash Host I/O Limits (Quality of Service controls for VMAX) support defining limits to enforce service levels and make application performance even more predictable. Users can set maximum IOPS and/or throughput limits on a per application basis. VMAX All Flash automatically balances the limits across directors and ports and supports two levels of cascaded limits to simplify performance management in multi-application, multi-tenant, and cloud environments.

LEVERAGING THE CLOUD FOR HIGH EFFICIENCY

Not all clouds are created equal. CloudArray for VMAX All Flash gives users the ability to tier "cold data" off of VMAX All Flash storage to the hybrid cloud for greater levels of storage efficiency that combines the lower cost/scalability of the cloud with the power of VMAX All Flash.

CloudArray supports block and file data, as well as numerous cloud storage providers, to give customers full flexibility whether they are leveraging existing cloud investments or beginning a new path to the cloud. CloudArray's local caching, enterprise encryption and in-cloud snapshots ensure that data remains available and secure, while providing VMAX All Flash customers with access to an additional cloud tier.

Flash Optimized Performance
FlashBoost delivers up to 100% faster read performance for high demand transaction processing workloads

FLASH-OPTIMIZED BY DESIGN

Slow is not an option with the new VMAX All Flash. Engineered for 3D NAND flash, VMAX All Flash arrays outperforms solutions that offer flash drives as add-ons to traditional arrays conceived for 15K RPM disk drives. VMAX All Flash eliminates bottlenecks with FlashBoost technology to deliver the highest performance and the lowest latency for read-intense OLTP applications, while leveraging huge write caching to reduce response time on heavy write workloads.

Each VMAX All Flash array leverages the latest electronics and flash technology to super-charge the most demanding dynamic environments. Each VMAX All Flash model offers advanced 3D NAND flash, third-generation Intel multi-core processors, InfiniBand 56 Gb/s interconnect technology, PCIe Gen 3 I/O, and native 6 Gb/s SAS drive infrastructure.

IDEAL FIT FOR YOUR DATA CENTER

VMAX All Flash introduces unmatched breakthroughs in performance density and packaging designed to reduce costs and fit all of your data center needs. Each array can store up to 480 high-density drives and deliver a complete VMAX All Flash engine on a single floor tile—that's an industry first of up to 1.7M IOPS in a single rack.

Up to 120 Flash Drives per Shelf

For maximum agility, VMAX All Flash racks can be separated by up to 25 meters to avoid columns and other obstacles in a data center without a need to ever reserve empty floor tiles for future array growth. And all VMAX All Flash arrays support industry standard 19-inch racks and optional third-party racking to conform to your data center infrastructure.

ALWAYS-ON AVAILABILITY (HA/RAS)

VMAX All Flash reliability, availability, and serviceability (RAS) make it the ideal platform for open systems and mainframe environments requiring always-on availability. These arrays are architected to provide six-nines of availability in the most demanding, mission-critical environments. VMAX All Flash availability, redundancy, and security features are listed below.

ALWAYS ON WITH VMAX ALL FLASH

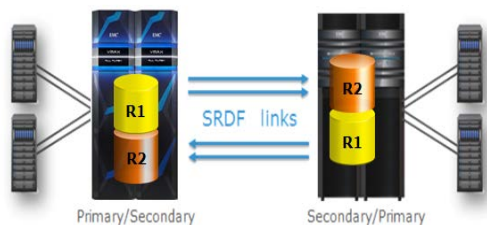| Eliminate Costly Downtime	Exceed Stringent Replication SLAs (RTO, RPO)	Eliminate Planned Downtime	Ensure 100% Data Integrity, Avoid Data Breach
Proven 6 Nines of Availability Advanced Fault Isolation, map-out faulty memory DIMMS, mirrored memory no single points of failure	**Gold Standard in Multi-Site Replication** Proven Disaster Recovery and rapid restart; 3-site, 4-site Replication, Active-Active SRDF	**Non-Disruptive HW and SW Upgrades** Continuous IO through parallel microcode NDUs, upgrade HYPERMAX O/S within seconds	**T10 DIF Data Coding** Single Bit Error Correction, validation checksum through T10 DIFF, Data at Rest Encryption

- No single points of failure—all components are fully redundant to withstand any component failure
- Completely redundant and hot-pluggable field-replaceable units (FRUs) to ensure repair without taking the system offline
- RAID protection levels 5 and 6 to match different data protection requirements, with the RAID members distributed among power zones in disk array enclosures (DAEs) to assure high availability (HA) even if an entire power zone fails
- Mirrored cache, where the copies of cache entries are distributed to maximize availability
- Vault to flash with battery backup to allow for cache de-stage to flash and an orderly shutdown for data protection in the event of a power failure
- Active-active remote replication via SRDF/Metro with read/write access to both Site A and Site B ensures instant data access during a site failure.
- Fully non-disruptive upgrades, including loading HYPERMAX Operating System software from small updates to major releases
- Continuous system monitoring, call-home notification, and advanced remote diagnostics
- Data at Rest Encryption with integrated RSA® key manager, FIPS 140-2 compliant to meet stringent regulatory requirements
- T10 DIF data coding, with extensions for protections against lost writes
- Detailed failure mode effects analysis (FMEA) during design of each component to ensure failure conditions can be handled gracefully
- Extensive fault detection and isolation, allowing early wear-out detection and preventing the passing of bad data as good
- Service defined and scripted to ensure success, including color-coded cabling, cable positioning, scripted steps, and checks of key parameters in those scripts
- All flash cache data vault capable of surviving two key failures, ensuring that the system comes back even when something was broken before the vault and something else fails when returning from the power cycle
- Support for thermal excursions with graceful shutdown if, for example, a data center loses air conditioning
- Integrated data protection via EMC ProtectPoint backup and rapid restore, combining the gold standards in backup with industry leading SRDF replication technology

Hardware Encryption

- Encrypts all drives
- No performance penalty
- Automated key management
- Optimized for block and file

EMC SRDF Software:
The world's most powerful and trusted solution for remote replication, protecting customer's most critical information.

EMC ProtectPoint:
Virtually eliminate backup impact on database servers.

TRUSTED REPLICATION AND SECURE SOLUTIONS FOR ALWAYS ON AVAILABILITY

EMC TimeFinder® and EMC SRDF software are the most powerful and trusted applications for local and remote storage replication available in the industry. These storage applications enable local and remote snaps and clones for rapid in-array backup and restore, facilitate parallel processing activities like application testing and development, and guard against primary-site disasters and outages.

New TimeFinder SnapVX software features zero-impact snaps, simple user-defined names, faster snapshot creation/expiration, cascading, compatibility with SRDF/FAST, and support for legacy VMAX replication capabilities like TimeFinder Clone, VP Snap, and Mirror (emulation mode). SnapVX reduces replication storage costs by up to 10x and is optimized for cloud scale with its highly efficient snaps and expansion of up to 16 million snaps per array. Customers can take up to 256 snapshots and establish up to 1024 target volumes per source device, providing read/write access as pointer (snap) or full (clone) copies.
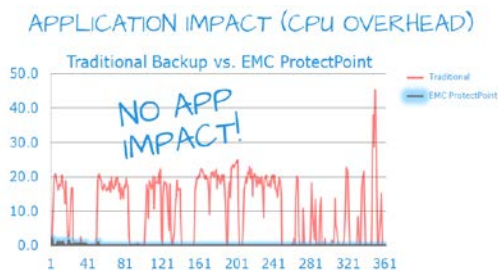
The industry's first zDP for mainframe solution enables recovery from logical data corruption without the need to restore from a full offline backup or BCV (Business Continuance Volume, otherwise referred to as a "Gold Copy" among mainframe storage administrators). This unprecedented feature allows administrators to recover from logical data corruption within minutes versus days.

An enhanced version of SRDF delivers faster and more efficient replication for VMAX All Flash, allowing customers to protect more capacity without having to add bandwidth. Enhanced SRDF combines new multi-core, multithreading techniques with powerful hardware compression to increase replication bandwidth and lower operational costs.

SRDF/Metro delivers active-active high availability for non-stop data access and workload mobility – within a data center and across metro distance. It provides array clustering of VMAX All Flash, enabling even more resiliency, agility, and data mobility. SRDF/Metro enables hosts and host clusters to directly access a LUN or storage group on the primary SRDF array and secondary SRDF array (Sites A and B). This level of flexibility delivers the highest availability and best agility for rapidly changing business environments.

DATA AT REST ENCRYPTION

VMAX All Flash Data at Rest Encryption provides hardware-based, on-array encryption, protecting block and fie storage from unauthorized access when drives or arrays are removed from the data center. This technology eliminates the need for drive erasure services and allows for rapid decommissioning and repurposing of arrays, while helping achieve regulatory compliance. Encryption offers intelligent key management that is easy to implement and maintain. Administrators can leverage automated embedded key management since there is no manual user intervention required to manage VMAX encryption keys.

EMC PROTECTPOINT INTEGRATED BACKUP FROM VMAX ALL FLASH TO DATA DOMAIN

EMC ProtectPoint provides faster, more efficient backups while eliminating backup impact on application servers. By integrating VMAX All Flash with Data Domain storage, ProtectPoint reduces cost and complexity by eliminating traditional backup applications while still providing the benefits of native backups. Key customer benefits include: Achieve faster, more frequent backups; Instantly access application backups from Data Domain for simple recovery; Virtually eliminate backup impact on application servers; Eliminate the need for a dedicated backup server.

EMC GLOBAL SERVICES

VMAX All Flash platforms include a limited hardware warranty*. VMAX All Flash hardware and software maintenance contracts offer 24x7 access to technical expertise, Online Services, remote monitoring and problem resolution, on-site services, and premium software maintenance providing 24x7 access to technical expertise and rights to new releases of the software at no additional charge.

EMC Global Services provides the strategic guidance and technology expertise that organizations need to address their business and information infrastructure challenges and to derive the maximum value from their information assets and investments. Our 16,000+ professional services and support services experts worldwide, plus a global network of alliances and partners, leverage proven methodologies, industry best practices, and experience and knowledge derived from EMC's information-centric heritage to address the full spectrum of customer needs across the information lifecycle: strategize, advise, architect, implement, manage, and support. Ask your EMC sales representative about the specific services that can benefit your organization.

* Warranties may vary outside the United States. Contact your EMC representative for local warranty and service terms and conditions.

EMC Corporation was named to TSIA 2013 to the elite status as a four-time Hall of Fame Lifetime Achievement Award winner.

https://www.tsia.com/resources/press-releases/2013-press-releases/tsia-names-2013-star-award-winners.html

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DATA SHEET