EMC SYMMETRIX VMAX 20K
STORAGE SYSTEM

The world’s most trusted storage platform

MEETING THE FUTURE GROWTH DEMANDS OF VIRTUAL IT ENVIRONMENTS

Enterprise-critical applications—those which drive the core of an organization—require the highest availability infrastructure to support the most stringent service levels. EMC meets this need with a high performing, functionally capable, and competitively priced high-end networked storage system—the EMC® Symmetrix® VMAX® 20K with the Enginuity™ operating environment. The Symmetrix VMAX 20K system introduces a revolutionary scale-out architecture created to match the future storage growth demands of virtual IT environments, while reducing costs for our customers.

Virtual Matrix

The revolutionary Virtual Matrix Architecture provides the foundation to scale to hundreds of petabytes of capacity, supporting thousands of servers, and millions of IOPS delivered to that capacity, all flexibly deployed throughout a data center and able to be controlled through a single screen.

SYMMETRIX VMAX 20K—A STORAGE ARCHITECTURE PURPOSE-BUILT FOR THE VIRTUAL IT ENVIRONMENT

Driven by unrelenting data growth, storage platforms must efficiently scale to much larger capacities and higher performance, while leveraging the best of emerging technologies and reducing cost. The EMC Symmetrix VMAX 20K system features a revolutionary Virtual Matrix Architecture™ that builds upon the rich heritage of the Symmetrix multi-controller platform and extends the value of the Direct Matrix Architecture® to deliver unprecedented performance, availability, and functionality at a reduced cost. The unique scale-out architecture of the Symmetrix VMAX 20K system provides the foundation to scale to hundreds of petabytes of capacity, supporting thousands of servers, and millions of IOPS delivered to that capacity, all flexibly deployed throughout a virtual IT environment and able to be controlled through a single screen.

ESSENTIALS

- Reduce cost with revolutionary scale-out architecture created to match the future storage growth demands of virtual enterprise IT environments
- Rely on highly available, high-performing storage that will expand quickly and easily
- Get unprecedented scale and consolidation results while reducing cost
- Reduce costs and raise service levels automatically with FAST VP
- Integrate tightly with virtualized server environments to simplify administration and accelerate server operations
- Increase capacity utilization and automatically balance data layout with Virtual Provisioning
- Provision storage more easily, reducing labor and risk of error using Auto-provisioning Groups
- Improve compliance efforts and reduce risk with Symmetrix Data at Rest Encryption, FIPS 140-2 Certified
- Seamlessly migrate to new VMAX 20K systems
- Simplify day-to-day Symmetrix management with Symmetrix Management Console ease-of-use capabilities
- Replace multiple high-end arrays with one Symmetrix VMAX 20K system, saving energy, footprint, weight, and acquisition costs

The revolutionary Virtual Matrix Architecture provides the foundation to scale to hundreds of petabytes of capacity, supporting thousands of servers, and millions of IOPS delivered to that capacity, all flexibly deployed throughout a data center and able to be controlled through a single screen.
The Symmetrix VMAX 20K system architecture provides a Virtual Matrix™ that can scale beyond the confines of a single system footprint. The core element of the Virtual Matrix is the Symmetrix VMAX Engine. VMAX Engines, which include cache, front-end connectivity, and back-end connectivity are the foundation of the Symmetrix VMAX 20K system. The Virtual Matrix scales by aggregating up to eight VMAX Engines as a single system with fully shared connectivity, processing, and capacity resources.

UNMATCHED AVAILABILITY AND INFORMATION-CENTRIC SECURITY BUILT IN

A revolutionary architecture and blazing performance are meaningless without uninterrupted information availability. Symmetrix VMAX 20K systems come standard with non-disruptive everything. EMC’s philosophy has always been to anticipate whatever might disrupt information access and prevent it. Symmetrix VMAX 20K systems take this philosophy to an even higher level.

The Enginuity operating environment offers unmatched availability and reliability with non-disruptive operations and upgrades—with no storage or application downtime. Add to this non-disruptive upgrades of EMC software applications, non-disruptive storage configuration changes, and non-disruptive serviceability—all designed to ensure your access to vital information is never in doubt—and your service levels are never compromised. Enginuity also features continuous monitoring and testing to ensure data integrity, as well as intelligent cache optimization and autonomous tuning of drive-read patterns to optimize application performance.

The Symmetrix VMAX 20K system’s Enginuity operating environment is optimized for increased availability, reliability, performance, and capacity utilization on all tiers with all RAID types, reducing total cost of ownership (TCO) while achieving predictable service-level attainment. Enginuity forms the foundation for FAST VP, TimeFinder, Symmetrix Remote Data Facility (SRDF) and Unisphere for VMAX. Enginuity supports a full complement of available EMC and ISV-supplied storage protocols and applications (including GDPS, TPF, and PPRC for mainframe environments) to meet virtually any business demand.

Enginuity enables simultaneous connection to virtually all mainframe, UNIX, Windows, and Linux platforms—the most extensive connectivity choices in the industry—and all validated in EMC’s interoperability labs. The result: you can do whatever you want with your information, at any time, and with fewer staff and greater speed and efficiency.

Securing sensitive information is one of the greatest challenges facing companies today and the most important data security threats are related to the protection of the storage environment. EMC Enginuity provides the highest level of data integrity with integrated technology from RSA®, the security division of EMC, to deliver built-in security capabilities that make it easier to reduce risks to sensitive data and improve compliance efforts. The Symmetrix Service Credential, secured by RSA, prevents unauthorized service actions on the service processor. Integration with RSA enVision® provides automated, policy-based audit log management across the enterprise.

DATA AT REST ENCRYPTION (FIPS 140-2 CERTIFIED)

Symmetrix Data at Rest Encryption provides hardware based on array encryption for Symmetrix VMAX 20K systems, protecting your information from unauthorized access when drives are removed from the array. It replaces the need for disk erasure services and allows for rapid decommissioning and repurposing of arrays, while helping you achieve compliance with security and privacy standards. Symmetrix encryption offers intelligent key management which is easy for storage administrators to implement and maintain. There are two key management options. Administrators may select either automatic internal key management or integration with an RSA RKM/DPM key manager. EMC is the first array vendor
to build FIPS 140-2 certified Data at Rest Encryption for all drive types with full support for auto-tiering. Symmetrix encryption is compatible with all EMC VMAX features, providing encryption without performance degradation to existing applications.

At the system hardware level, EMC starts with the most reliable components available. Then we add 100-percent internal redundancy to ensure that no single fault can stop the flow of information. Multiple redundant power supplies connected to independent power sources provide additional protection. Battery backup of all power systems ensures that all data in memory is safely written to the drive before the Symmetrix array initiates an orderly shutdown in the event of complete power loss. Additional reliability features include permanent spares, compensative cooling, and extensive environmental monitoring. Before each Symmetrix VMAX 20K system is shipped, it undergoes rigorous thermal, vibration, and operational checks to make sure it arrives fully functional in your virtual IT environment.

At the software level, advanced integrity features ensure your information is always protected and available. A choice of RAID 1 (mirroring), RAID 10, RAID 5 (3+1 and 7+1), and RAID 6 (6+2 and 14+2) protection enables you to apply the protection level most appropriate to the value and performance requirements of your information.

**SYMMETrIX VMAX 20K—HIGH PERFORMANCE AND SCALABILITY**

The Symmetrix VMAX 20K array enables massive consolidation and incremental scalability, so you get all the benefits of tiered storage on one platform, as well as the flexibility to rapidly address the changing needs of your business. For the most extreme and demanding storage environments in the world, Symmetrix VMAX 20K is a powerful solution that’s remarkably simple to manage. Symmetrix VMAX 20K systems offer:

- **Reduced cost and optimized service-level delivery via scale-out and tiering**
  - Deliver performance on demand, automatically optimize service levels in tiered environments, and scale storage capacities while reducing costs
  - Optimize the utilization of flash drives and increase performance of SATA drives with FAST VP and VP
  - Accelerate server performance with EMC VFCache™. EMC VFCache is a server Flash caching solution that reduces latency and increases throughput to dramatically improve application performance by leveraging intelligent caching software and PCIe Flash technology. VFCache accelerates reads and protects data by using a write-through cache to the networked storage to deliver persistent high availability, integrity, and disaster recovery. VFCache, coupled with array-based EMC FAST software, creates the most efficient and intelligent I/O path from the application to the data store. The result is a networked infrastructure that is dynamically optimized for performance, intelligence, and protection for both physical and virtual environments.

- **Management abstraction enables ease, speed, and automation**
  - Quick, easy, and automated provisioning of storage for virtual servers with a single action
  - VMware vStorage APIs for Array Integration (VAAI) to offload VM operations to the array, optimizing server performance

- **24x7 x forever application availability**
  - Eliminate unplanned and planned outages with fully non-disruptive operations and achieve zero data loss with extended-distance replication

Symmetrix VMAX 20K systems are ideal for the most extreme application demands, such as where large-scale consolidation is required by the world’s most information-intensive enterprises. The revolutionary Virtual Matrix Architecture with its scalable performance and capacity provides the most configurable and flexible high-end storage array so that your enterprise realizes even greater ROI in your EMC investment.
SYMMETRIX VMAX 20K SYSTEM CONFIGURATIONS
Symmetrix VMAX 20K systems with the scale-out Virtual Matrix Architecture can be configured with 48 to 2,400 drives for a maximum capacity of up to two petabytes. Systems provide up to 1 TB of memory and up to 128 Fibre Channel ports, or 64 FICON ports, or 64 10 Gb/s Ethernet ports, or 64 iSCSI connections. Symmetrix VMAX 20K is a distributed multi-engine storage system that can non-disruptively scale from one to eight VMAX Engines. Systems are configured around a central system bay and adjacent storage bays of up to 240 drives each. You have a full range of drive options—from ultra-fast Enterprise Flash drives to the highest capacity 2 TB SATA drives available.

Symmetrix VMAX 20K arrays support the latest front-end connections with 8 Gb/s Fibre Channel, 8 Gb/s FICON, and 10 Gb/s Ethernet for FCoE, iSCSI, and SRDF connectivity.

Symmetrix VMAX 20K systems are available in a wide variety of channel connection, processor power, global memory size, drive performance and capacity, and data protection combinations. Your sales representative can assist in determining which Symmetrix VMAX 20K system is the most appropriate solution for your high-end storage needs.

VCE VBLOCK SERIES 700
Formed by EMC and Cisco, with investments from VMware and Intel Corporation, VCE, the Virtual Computing Environment Company, leverages best-in-class technology and service capabilities to meet the business and IT needs of customers. The Vblock® 700 Infrastructure Platform integrates compute, network, VMAX 20K storage, virtualization, and management components from trusted, industry-leading vendors—Cisco, EMC, and VMware—to deliver a tightly unified infrastructure that your business can rely on while simplifying IT operations. To see how your business can leverage the power of an integrated Vblock 700 solution, visit www.vce.com, or contact your EMC or VCE sales representative.

VCE Vblock 700: A Scalable High-End Storage Array—Symmetrix VMAX 20K systems can be configured with 48 to 2,400 drives for a maximum capacity of up to two petabytes. The multi-engine storage system can non-disruptively scale from one to eight VMAX Engines. Systems are configured around a central system bay and adjacent storage bays of up to 240 drives each.

FAST VP
Symmetrix VMAX 20K systems offer a broad array of functionality and tools that simplify storage management and reduce costs to help accelerate the transformation to the hybrid cloud.

EMC FAST VP software optimizes performance in multi-tiered Symmetrix VMAX 20K systems by allocating and relocating application workloads based on service-level agreements. With granular tiering at the sub-LUN level, FAST VP can help optimize $ per IO and $ per GB. FAST VP reduces overall TCO by lowering acquisition costs, simplifying management, and reducing energy and space requirements. Highly responsive to dynamic-performance environments, FAST VP can help IT more quickly adapt to changing business needs and manage more resources with fewer staff. FAST VP intelligence can be leveraged across the entire data center including open systems, IBM i, and System z environments.

FEDERATED TIERED STORAGE
Federated Tiered Storage provides the capability to put heterogeneous arrays behind VMAX 20K to consolidate and simplify operations in the hybrid cloud. With FTS, customers can use...
trusted Symmetrix features such as FAST VP, SRDF, EMC TimeFinder®, and VLUN to extend the life and value of existing storage arrays in the data center.

In a FAST VP configuration, the external array can be used as a lower tier, and FAST will automatically move data to VMAX 20K as additional performance is required from the application.

FTS enables the hybrid cloud by creating cooperating pools of resources and by enabling dynamic application and data movement—key functionality for delivering Infrastructure as a Service (IaaS). FTS technology allows you to leverage the benefits of EMC’s trusted innovations across the entire hybrid cloud by consolidating, optimizing, and sharing both EMC and non-EMC storage resources. Using FTS, you can integrate legacy arrays to maximize efficiency, protect your storage investment, and simplify the management of your storage landscape.

MANAGEMENT ABSTRACTION TO INTELLIGENTLY INTEGRATE INTO VIRTUAL ENVIRONMENTS

EMC Unisphere for VMAX is an intuitive management interface that allows IT managers to maximize human resources by dramatically reducing the time required to provision, manage, and monitor storage assets. Unisphere delivers the simplification, flexibility, and automation that are key requirements to accelerate the transformation to the hybrid cloud.

— EMC ProSphere™ provides end-to-end management and analysis of hybrid cloud environments, including compute, network, and storage resources.

— EMC z/OS Storage Manager (EzSM) is a mainframe software product for discovery and viewing of a Symmetrix environment connected to a z/OS host. EzSM provides facilities to handle volumes, data sets, catalogs, and detailed Symmetrix VMAX 20K system functionality information.

— VMware® vStorage APIs for Array Integration (VAAI) offload virtual machine operations to the array to optimize server performance. VAAI enables VMware vSphere™ to free up server resources by offloading certain operations. In VMware environments, VMAX 20K supports the following VAAI components:

  • Full Copy—Offloads replication to VMAX 20K to enable up to 10 times faster virtual machine deployments, clones, snapshots, and VMware Storage vMotion® operations.
  • Block Zero—Initializes file system block and virtual disk space more rapidly, with as much as 10 times less I/O for VMFS (Virtual Machine File System) formatting and relocation.
  • Hardware-Assisted Locking—Enables more efficient metadata updates and assists virtual desktop deployments, allowing up to 10 times more virtual machines per data store.
  • VMware vSphere Storage APIs for Storage Awareness (VASA)—Allows VMware administrators to view VMAX 20K drive types (Flash, FC, SAS, or SATA) as needed. With VASA, VMware administrators have a single management view into both the virtualization and storage infrastructures.

VIRTUAL PROVISIONING

Symmetrix Virtual Provisioning helps reduce cost, improve capacity utilization, and simplify storage management. Users can present a large amount of capacity to a host and then consume space only as needed from a shared pool. This improves TCO by reducing initial over-allocation of storage capacity. Virtual Provisioning also offers automated pool rebalancing, helping expand thin pools in small increments while protecting performance, as well as non-disruptive shrinking of thin pools to help reuse space to improve capacity utilization. Virtual Provisioning can help reduce labor costs by simplifying data layout and reducing the steps required to accommodate capacity growth.
Users have new mobility and space efficiency when moving into and out of thin pools, and with TimeFinder/Clone, thick-to-thin replication that ensures only host-written space is copied to target thin volumes. In addition, users can automatically reclaim unused space when migrating from standard to thin volumes using EMC SRDF and Open Replicator.

BUSINESS CONTINUITY SOLUTIONS
The EMC TimeFinder and SRDF families of software are powerful suites of local and remote storage replication solutions. These solutions enable the creation of business-continuance volumes for parallel processing activities like backup, testing and development, and local restore, as well as remotely replicated copies to guard against primary site disasters and outages. The TimeFinder and SRDF families are the most widely deployed set of local and remote replication solutions in the industry and are installed in tens of thousands of demanding environments worldwide.

LOCAL REPLICATION: THE TIMEFINDER FAMILY
The EMC TimeFinder family of software provides a local copy of data, independent of the host and operating system, application, and database. The EMC Symmetrix TimeFinder family of local copy software is the most field-proven, widely deployed, array-based, point-in-time solution in the world with tens of thousands of licenses shipped into the most-demanding IT environments. Leveraging the industry-leading, high-end Symmetrix system, TimeFinder offers the most choice and flexibility to meet virtually any service-level requirement, while enabling cost control or reduction for increased competitive advantage.

EMC TIMEFINDER BASE PRODUCTS
• TimeFinder/Clone—Creates a functional, full-volume, independent host-addressable, local point-in-time copy of a Symmetrix production device, and allows up to 16 active clones of a single production device, all of which are immediately available for both read and write access and can use RAID 5 and/or RAID 6 protection schemes.

• TimeFinder/Snap—Creates a high-performance, space-saving, independent host-addressable, logical local point-in-time copy of a Symmetrix production device, and allows up to 128 active snapshot copies of a single production device, all of which are immediately available for both read and write access and can use RAID 5 and/or RAID 6 protection schemes.

• TimeFinder VP Snap—Creates a space-efficient snap for Virtual Pool devices. TimeFinder VP Snap provides the efficiency of Snap technology with improved cache utilization and simplified pool management. Up to 32 VP Snaps per source volume can be created.

EMC TIMEFINDER ADD-ON OPTIONS
• TimeFinder/Consistency Groups—Provided at no additional cost, the Consistency Groups option ensures dependent-write consistency of application data when creating a point-in-time image across multiple devices associated with an application within a single Symmetrix system or applications that also span multiple Symmetrix systems.

• TimeFinder/Exchange Integration Module and TimeFinder SQL Integration Module—These options integrate the TimeFinder family with Microsoft Exchange and SQL Server® applications for automated backup and restore.

REMOTE REPLICAITION: SRDF
For replication between Symmetrix systems, the EMC SRDF family of software provides remote mirroring independent of the host and operating system, application, and database. SRDF remote mirroring helps companies manage planned and unplanned outages. With
24x7x365 data availability, businesses can focus on maximizing revenue generation and customer support opportunities, improving productivity, and controlling or reducing costs for increased competitive advantage.

**EMC SRDF BASE PRODUCTS**

- **SRDF/Synchronous (SRDF/S)**—Maintains a realtime synchronized mirror of a Symmetrix production data device to a secondary site Symmetrix data device, providing a recovery point objective of zero data loss.

- **SRDF/Asynchronous (SRDF/A)**—Maintains a near-realtime synchronized mirror of a Symmetrix production data device to a secondary site Symmetrix data device, providing a recovery-point objective that could be as minimal as a few seconds.

- **SRDF/Data Mobility (SRDF/DM)**—Provides for the transfer of a Symmetrix production data device to a secondary-site Symmetrix data device that can be at any distance, permitting information to be periodically mirrored for disaster restart, information sharing for decision support or data warehousing activities, or for data migration.

**EMC SRDF ADD-ON OPTIONS**

- **SRDF/Extended Distance Protection (SRDF/EDP)**—Enables lower-cost achievement of zero data loss at an out-of-region site. The two-site disaster restart solution uses the cascaded SRDF model of operation, combined with the use of the driveless R21 device in the intermediate site, allowing the intermediate site to provide data pass-through to the out-of-region site.

- **SRDF/Star**—Enables resumption of SRDF/A with no data loss between two remaining sites, providing continuous remote data mirroring and preserving disaster-restart capabilities. SRDF/Star offers a combination of continuous protection, changed-data resynchronization, and enterprise consistency between two remaining sites in the event of the workload site going offline due to a site failure, fault, or disaster event.

- **SRDF/Automated Replication (SRDF/AR)**—Enables rapid disaster restart over any distance with a two-site, single-hop option using SRDF/DM in combination with TimeFinder, or a three-site, multi-hop option used in combination with SRDF/S, SRDF/DM, and TimeFinder.

- **SRDF/Cluster Enabler (SRDF/CE)**—Enables automated or semi-automated site failover using SRDF/S or SRDF/A with Microsoft Failover Clusters. SRDF/CE allows Windows® Server 2003 and Windows Server 2008 Enterprise and Datacenter editions running Microsoft Failover Clusters to operate across a single pair of SRDF-connected Symmetrix arrays as geographically distributed clusters.

- **SRDF/Consistency Groups (SRDF/CG)**—Provided at no additional cost, SRDF/CG ensures application dependent-write consistency of the application data being remotely mirrored by SRDF in the event of a rolling disaster—across multiple Symmetrix systems or across multiple devices within a Symmetrix—providing a business point of consistency for remote-site disaster restart for all identified applications associated with a business function.

- **EMC RecoverPoint**—The Symmetrix VMAX 20K system also supports the EMC RecoverPoint solution for local replication using continuous data protection (CDP), synchronous and asynchronous continuous remote replication (CRR), and concurrent local and remote (CLR) data protection, all with point-in-time DVR-like recovery capabilities. The VMAX 20K system has integrated RecoverPoint Splitter functionality. The RecoverPoint family helps protect companies from data loss due to common problems such as server failures, data corruption, software errors, viruses, and end-user errors, while also protecting against catastrophic events that can bring an entire data center to a standstill.
RecoverPoint enables replication among EMC storage families, as well as between EMC and non-EMC arrays. Leveraging RecoverPoint across EMC block platforms—VMAX 20K, VMAX 20K, VMAX 10K, VNX®, and VPLEX®—can help reduce wide-area network (WAN) costs, regardless of the distance between private and public clouds.

The EMC RecoverPoint family delivers dramatic cost savings by eliminating complex, non-performing data protection schemes, and application-specific point products in favor of deploying a single, easy-to-manage local and remote replication solution.

RecoverPoint supports application bookmarks, instantaneous recovery, and bi-directional local and remote replication. A unique clustered architecture provides linear scalability to support the most demanding environments. Support for heterogeneous storage, hosts, networks, and SANs enables storage investment protection, enhances business continuity, and facilitates storage consolidation. RecoverPoint includes technologies to make the best use of available network and storage resources, including bandwidth reduction and data compression, journal compression, and snapshot consolidation.

INFORMATION MOBILITY AND MIGRATION

The Symmetrix VMAX 20K series enables online data mobility and migration while minimizing complexity and disruption. Move data between storage tiers, platforms, and sites—quickly, efficiently, and without disruption. The Symmetrix Migrator package is a suite of mobility and migration solutions that provide organizations with choice and flexibility to use the right tool at the right time to deliver the right service level:

• **Federated Live Migration (FLM)**—Eliminates the complexities of host-based or SAN-based migration strategies by leveraging the intelligence of the arrays themselves, affording the first and only truly non-disruptive migration solution—one that does not require “insertion” or addition of new hardware or software to the organization’s SAN or hosts, and supports combinations of migrating thick-to-thick, thick-to-thin, and thin-to-thin data, as well as consolidating multiple systems onto one Symmetrix system.

• **EMC Open Replicator for Symmetrix**—Enables both data mobility and data migration to and from Symmetrix and other heterogeneous arrays in a number of sophisticated configurations.

• **EMC z/OS Migrator**—Enables host (mainframe) migrations from any vendor’s storage array to Symmetrix without any application downtime or disruption to business continuity readiness.

• **EMC Open Migrator/LM**—Provides host-based, non-disruptive data migration/data mobility—at the volume level—for Microsoft Windows, Linux, and UNIX servers.

• **SRDF/Data Mobility**—Delivers high-performance, array-based data mobility and migration of data from one Symmetrix to another Symmetrix anywhere in the world.

If you prefer to have assistance performing mobility or migration operations, you can engage EMC Global Services. The EMC Total Migrator service offering automates migration planning with event management, migration methodologies, and auditing to streamline migrations and reduce risk. EMC E-Lab™ Advisor provides online remediation and validation including health, EOL/EOSL, and compatibility checks against E-Lab’s ESM and migration best practices.

MAXIMIZE SYMETRIX VMAX 20K BENEFITS WITH EMC GLOBAL SERVICES

EMC delivers a full complement of services for EMC Symmetrix VMAX 20K hardware and software to ensure that your Symmetrix VMAX 20K system performs as expected in your
environment, while minimizing risk to your business and budget. Expert planning, design, and implementation services help you quickly realize the value of your hardware and software in your environment, no matter how simple or complex.

After implementation, EMC’s data migration services can help you plan, design, and safely migrate your critical data over any distance to your new system. EMC will also help you integrate your new system into your information architecture and applications such as VMware, Microsoft Exchange and SQL Server, Oracle databases and applications, and SAP, and manage your new environment when it is complete. Extensively trained professional services personnel and project management teams, leveraging EMC’s extensive storage deployment best practices, and guided by our proven methodology, accelerate the business results you need without straining the resources you have.

EMC GLOBAL SERVICES FOR THE IT LIFECYCLE
EMC Global Services delivers results to our customers throughout the IT lifecycle: Plan, Build, Manage, and Support. Strategic information and storage consulting services from EMC Consulting helps companies achieve the maximum value from their information, at the lowest total cost, at every point in the information lifecycle. EMC Technology Solutions professionals deliver product-specific point solutions in addition to comprehensive custom planning, design, implementation, and integration services for EMC technology—everything from consolidation of your current resources to a transformation of your environment to achieve information lifecycle management.

EMC Customer Service—six-time winner of the SSPA STAR Award for outstanding mission-critical support—helps you keep your information available 24x7 with an array of services available whenever, wherever, and however you need them. Our eServices capabilities and remote support offerings mean support is just a call or click away. In addition, EMC Education Services drives the value of your investment with a comprehensive training and certification program that assesses your current knowledge, develops and delivers a personalized training plan and curriculum, and finally, validates your knowledge and expertise through certification exams.

WARRANTY AND MAINTENANCE SUPPORT
Symmetrix VMAX 20K platforms include a three-year Premium support warranty, providing 7x24, same-day onsite support. The Symmetrix VMAX 20K Enginuity operating environment software warranty includes 90 days defective media replacement*. Warranties can be extended with an EMC Service Agreement.