

EMC - February 2004

Platform refresh - still a storage systems powerhouse

EMC, the hardware, software, storage solutions company

For those who thought that EMC Corporation's binge of software vendor acquisitions throughout 2002 and 2003 would distract the company from their bread-and-butter business of selling world-class storage systems - we've got news for you - this is NOT the case in 2004.

EMC made a series of significant product announcements on February 9, 2004, expanding its enterprise-class Symmetrix DMX line, refreshing its CLARiiON CX family of midrange arrays, and offering a slew of other hardware and software enhancements. Along with performance and cache upgrades, each platform gets some updated software functionality and new features.

To summarize what EMC is calling its most comprehensive product launch in the company's history:

- 5 new Symmetrix DMX-2 models: DMX1000-M2, DMX2000-M2, and DMX3000-M2, plus the DMX1000-P2 and DMX2000-P2 (replacing the earlier "ultra-performance" P models)
- 3 new CLARiiON CX models - CX300, CX500, and CX700
- NS700 integrated NAS solution, and NS700G NAS gateway offering (which is the subject of separate ESG review)
- Upgraded CPUs and drives for Centera in addition to a native Mainframe API

This brief will highlight the most critical parts of this broad set of enhancements and offer guidance on what's most important for users to understand. ESG expects 2004 to be a year in which EMC continues to evolve into a more balanced provider of both information and storage management solutions. The company realizes that to be a world-class solutions provider means maintaining the ability to deliver world-class storage systems. **That said, these announcements clearly show that EMC is still a storage systems leader, and one that knows the best software in the world can't make up for bad infrastructure.**

EMC in 2004

Over the past 12 months EMC has garnered a lot of attention and criticism for its aggressive acquisition moves. Since July 2003 EMC has acquired three software companies: Legato

Systems, content management king, Documentum, and the privately held, but very hot, VMWare.

EMC has worked hard over the past three years to increase the share of software it sells, but still derives over half of its more than \$6B in annual revenue from hardware sales. While EMC's ILM (information lifecycle management) strategy is in its earliest stages of development we applaud the company's willingness to consistently change the rules and shake up the market, while continuing to innovate. Diversification is the key to any technology vendor's long-term viability, and EMC is certainly moving into new, and in some cases, uncharted territory.

Symmetrix DMX-2 - faster and more powerful

Almost one year to the day that EMC reset the bar at the high end of the enterprise storage market with its DMX series, we now have DMX-2. The first generation DMX introduced a new Direct Matrix (DMX) architecture, a completely new design from previous Symmetrix systems. With up to 128 direct paths between the front-end channel directors and the global cache the DMX offered a maximum internal bandwidth of 64GB/sec, a 40x increase over the 1.6GB/sec throughput of the previous Symmetrix. Promising ample performance to handle the sustained demands of "24x7xforever" mission-critical applications, the original DMX allowed EMC to reclaim ownership of the performance crown in 2003.

EMC Symmetrix DMX and DMX-2 family				
	Entry	Midrange	Midrange	High-end
	Single bay	Single bay	Dual bay	Triple bay
DMX	DMX800	DMX1000	DMX2000	DMX3000
DMX-2		DMX1000 - M2	DMX2000 - M2	DMX3000 - M2
DMX-2 "ultra"		DMX1000 - P2	DMX2000 - P2	

With the DMX-2, EMC is raising the bar once again. DMX-2 configurations are identical to the original DMX

models in every way except one: they utilize new channel I/O directors with 1GHz PowerPC (PPC) CPUs. These are twice as fast as the 500 MHz PPCs on the base DMX systems introduced last year. These new DMX-2 configurations will most certainly improve performance and response times in I/O intensive applications such as OLTP or Decision-support systems.

Importantly, existing DMX systems can be field-upgraded to DMX-2 configurations. In fact, there is full data compatibility between the original DMX and the new DMX-2 models allowing for “data-in-place” upgrade, just as has been offered for the CLARiiON CX series (see below). This approach ensures investment protection for current DMX customers, as they can add performance to their existing systems should they need in the future. Customers planning a “data-in-place” upgrade should be aware that the systems do need to be taken offline in order to swap out the aforementioned I/O directors.

In addition to DMX-2, the entire Symmetrix DMX family will benefit from generous increases in global memory, faster 73GB 15K rpm drives and Enginuity (Symmetrix array operating environment) optimizations and enhancements. A new 32GB memory director effectively doubles the maximum cache for all models, with the largest configurations supporting up to 256GB of global memory. As the size of these enterprise-class systems balloon up to 84TB of raw capacity, with up to 576 drives on the DMX3000, accessing requested data from cache is faster than contending with the latency of disk drives read and write operations. And even the DMX800 system, the smallest Symmetrix and only one to offer a modular architecture similar to its CLARiiON stable mate, will benefit from the cache increases, faster drives, and Enginuity enhancements improving the price/performance value of the entire family.

Dial “P” for “Performance”:

EMC had previously introduced two DMX “P” or “performance” models aimed at satisfying the most performance-hungry customers, and at the same time responded to competitors’ claims that EMC was no longer the king of the performance hill. Although the number of environments that demand and are willing to pay for this level of performance are limited, EMC has decided the effort was worth it and has carried the “P” forward as an option in the form of the DMX1000-P2 and DMX2000-P2 models. Restricting the maximum number of drives per channel to 9 optimizes the system for specific workloads. **Users that are looking for more performance for their data warehousing or other sequential applications that are cache-unfriendly and punish the back-end of a disk array with constant I/O requests should consider the “P” models.**

Symmetrix DMX Software features:

EMC has further refined Enginuity, the Symmetrix operating system, continuing to refine the ability for customers to perform software upgrades and add additional capacity without taking the systems offline.

EMC is now offering native RAID 5 support across the entire DMX line, supporting traditional 3+1 and 7+1 configurations. While 3+1 and 7+1 configurations can’t coexist within the same frame, users who run RAID 1/10 or EMC’s Parity RAID can continue to do so along with RAID 5. Importantly, Symmetrix Optimizer now supports RAID 5 in addition to RAID 1. An optional software offering, Symmetrix Optimizer will automatically and dynamically rearrange drive layouts within a Symmetrix system to distribute I/O workloads across all available drives for the optimal total performance of the system.

EMC has also enhanced its SRDF/Asynchronous software by offering “N-to-N” multi-array replication support in mainframe environments. This enables users to deploy much larger remote replication and recovery scenarios than before.

CLARiiON CX - great midrange storage gets even better

The superb CLARiiON family of modular systems also gets a complete refresh, offering customers either data-in-place upgrades on current CX systems, or as new factory-built models. The CX300, CX500, and CX700 will replace the current CX200, CX400, and CX600 over time.

EMC CLARiiON CX family			
	Workgroup	Department	Data Center
	Single bay	Single bay	Single bay
CX (current family)	CX200	CX400	CX600
CX (new family)	CX300	CX500	CX700

CX300 - A great entry-level system gets UNIX support:

The entry-level CX300 receives double the cache to 2GB, double the number of host Fibre Channel (FC) ports to 4, and can support twice as many disk drives, up to 60, as the CX200. Most notably, where the CX200 supported almost no advanced software functionality, the new

CX300 offers SnapView support. **SnapView can provide entry-level users the same ability to perform point-in-time snapshots and even full volume copies for backup or business continuity operations, usually reserved for more expensive systems.**

Also worthy of note, EMC is adding UNIX support for the CX300 where the CX200 only supported Windows, Linux, and NetWare operating systems. **This broadens the appeal of this entry-level system, allowing users in mixed-environment shops to support their front-office Windows systems and their back-office UNIX systems with the same solution.** ESG also believes this strengthens EMC's position with UNIX-centric OEMs and channel partners such as Bull, Fujitsu-Siemens Corp., Arrow, Avnet, and even CDW, to now leverage the *entire* CX family into mixed Wintel / UNIX environments, not just the more powerful models.

CX500 and CX700:

The CX500 might be the one to watch this year, as it promises as much as double the performance of the CX400. Doubling the cache to 4GB and the number of CPUs from two to four should have considerable impact on both IOPS and MB/sec bandwidth. **The CX500 can perform double duty, offering nimble performance for transactional loads like messaging or financial applications while still being able to deliver the raw throughput demands of video streaming.** Twice the number of supported drives, up to 120, also means that this system can scale capacity as needed. With support for all advanced software features, ATA disk drives, and either Fibre Channel and iSCSI network connectivity options, the CX500 is a formidable contender in the hyper-competitive midrange market.

The CX700 remains at the top of the CLARiiON line with faster CPUs pushing the performance of this data center worthy array up nearly 50%, in the neighborhood of 200,000 cached IOPS. The number of hosts supported has been doubled, along with doubling the number of LUNs and twice the system bandwidth. With support for up to 240 drives and 8GB of cache, the CX700

should stack up well against competitive offerings from IBM, HP, and LSI Logic.

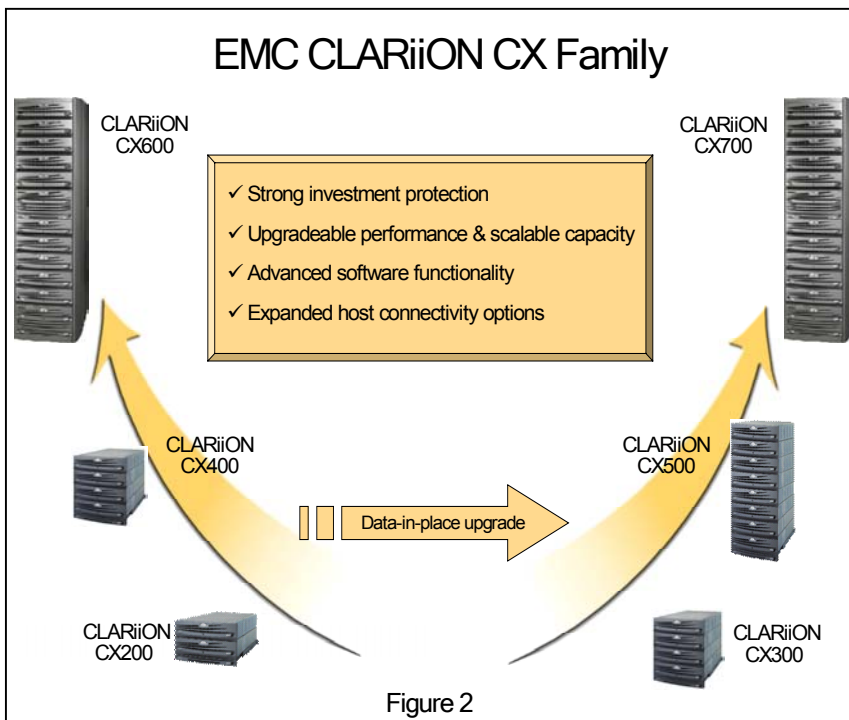
CLARiiON CX Software features:

EMC continues to add software value to the CLARiiON line to satisfy the ever-increasing demands of SME / SMB users. Most notable is the addition of incremental support in SANCopy. **This allows for just changed blocks to be migrated between source CX400/600 or CX500/700 systems to target CLARiiON, Symmetrix, and even competitive arrays.** Broadening its list of supported systems to include HP, IBM, and even Sun, this powerful tool allows users the flexibility to migrate data across local SANs and even over WAN distances via FC/IP. Tighter SnapView integration with Microsoft Exchange and SQL Server allows users to enhance their protection of critical email and database systems.

EMC is betting that its strong tradition of investment protection in the CLARiiON line will insulate it somewhat from the competitive threat of emerging, non-established vendors. **Data-in-place upgrades are available for customers migrating from CX200, 400, or 600 systems to the CX300,**

500, 700 series. Also important for users to consider is the fact that all current advanced software features are compatible with all CLARiiONs sold since 2001. As users accelerate their adoption of tiered-storage infrastructures, software functionality and data compatibility between the newest CLARiiONs and their predecessors is a key benefit of sticking with EMC.

The CLARiiON line continues to improve and EMC's relationship with its OEM and reseller partners are strong and expanding. **Though continually challenged to manage the hyper-aggressive Dell sales model, this partnership has allowed EMC to reach beyond its traditional Fortune 1000 customer base into incremental markets.**



Centera update

EMC has shipped more than 10PB of its Centera system in less than two years, making quite an impact in the market. EMC refers to Centera as a content-addressed storage (CAS) system, which stores data as independently addressable objects rather than files or blocks. EMC introduced this new type of storage solution to the industry in 2002 and EMC is now challenged to expand the addressable market for this solution while its major competitors and many emerging vendors work to bring similar technologies to market. While Centera supports both open systems and mainframe connectivity, to date an emulator or gateway was required between the mainframe and Centera. The gateway emulates mainframe tape drives, essentially fooling the system into thinking the IP-connected Centera is just another native ESCON/FICON-connected mainframe tape device. EMC has announced a native mainframe API within the standard Centera API SDK, essentially mitigating the need for any external gateway. Supporting IBM z/OS V1.2 and higher, this feature enables EMC to target the vast amount of reference information or fixed content resident on mainframe systems. **Centera can now allow concurrent access and storage of both mainframe and open systems-resident reference information without the need for any third-party equipment.**

The Bottom Line

Well-timed, well-choreographed, and well-positioned. That, in a nutshell, is our take on EMC's biggest product announcement in quite a while. While the media and analyst communities continue to debate EMC's M&A activities over the past year, it's easy (and dangerous) to forget what matters most - that EMC's future success rests largely on its ability to continue to innovate and deliver storage systems that IT professionals trust and business professionals want to buy.

Customers demand ever-increasing value at ever-decreasing prices, and EMC has done a good job of balancing these

opposing forces. While IBM and HDS continue to tout their own performance superiority based on popular industry benchmarks, EMC avoids such notoriously subjective venues. EMC stresses real-world performance and backs its more refined but still aggressive sales and marketing with world-class service and support.

This announcement sets the foundation for EMC's future which will be focused on tiered storage solutions and its nascent ILM strategy. Tiering storage systems is a prerequisite for any vendor's ILM strategy, and EMC understands this.

We expect 2004 to be a year of growth for EMC even while the vendor shifts its focus on how to best leverage its newly acquired Legato, Documentum, and VMWare assets. EMC is still missing a strong set of tape solutions to complement its broad base of disk systems, but ESG expects some progress to be made here over the next year. Although the company recently introduced a set of professional services aimed at helping customers move along the road towards the vision ILM promises, EMC still lacks the ability to deliver the type of comprehensive service engagements IBM Global Services and HP, for example, covet. EMC needs to figure out how to balance their technical innovation and sales skills with such services as part of its continued maturation.

Software will be a big part of the storage market's future, and an increasingly large percentage of EMC's and other vendor's revenues. But let's not forget that the files, blocks, and objects we're all trying to protect still need a place to live. With this announcement EMC has given its customers a bevy of excellent choices and very strong investment protection and value to boot.

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