THE CLIPPER GROUP
Navigator™
Navigating Information Technology Horizons℠
Published Since 1993 Report #TCG2008039 August 5, 2008

New *CLARiiON CX4* Delivers Less *and* Much More – Less Power, Less Footprint, Less Wasted Capacity – with Doubled Performance, Scale and Connectivity

Analyst: Michael Fisch

Management Summary

EMC recently announced the CLARiiON CX4 family of midrange storage platforms. "Bigger better faster" is what everyone expects from a storage platform upgrade, and EMC does not disappoint with the CX4, though the real news may be around the higher efficiencies enterprises can enjoy with the new platform.

Enterprises want more capacity and faster performance, because they need to store and access more data. They want greener storage, in the sense of consuming less energy and floor space, because energy prices are high, access to power may be limited, and data centers may be filled to capacity. They also want storage to be more cost-effective to own, and because IT budgets are constrained, they want to get more out of the money they spend. Like a river spilling over its banks, storage requirements in the Information Age are always rising, and enterprises continuously need better infrastructure to contain it.

The new CLARiiON CX4 storage platform cuts back power consumption, overhead capacity, and footprint, while virtually doubling performance, scale, and connectivity from the previous generation. It has numerous new capabilities:

- ***UltraFlex* technology** – For flexible, modular, online I/O configurations, which today includes iSCSI and Fibre Channel
- **Performance improvements** – Multi-core Intel Xeon processors, 64-bit *FLARE* operating system, and double the system memory
- **Energy-efficient technologies** – Lower-power 1 TB SATA drives, adaptive cooling and a pre-announced spin-down feature
- **Flash drives** – Deliver more than 30 times the IOPS for applications that demand ultra-fast performance
- **Virtual provisioning** – Includes new thin provision capability for efficient capacity utilization
- ***RecoverPoint* integration** – Integrated splitter for asynchronous local and remote replication for recovery to any point in time, plus WAN bandwidth reduction

This is much more than an incremental upgrade or midlife kicker. EMC rightly calls it an innovative *next-generation architecture*. Read on for details.

The New CLARiiON CX4

The *CLARiiON CX4* midrange storage family includes four different models, as profiled in *Exhibit 1* on the next page. It ranges from the entry CX4-120, which scales from 5 drives up to a maximum capacity of 120 drives (120TB with current drive options) and 6 GB of cache, to the upper-end CX4-960 with a capacity of 960 drives (951 TB) and 32 GB of cache. (The postfix indicates the number of

IN THIS ISSUE

➢ The New CLARiiON CX4 1
➢ Conclusion 3

drives.) Capacity and cache are double what the predecessor *CLARiiON CX3* series offered. It supports Fibre Channel and SATA II drives of various speeds and capacities, as well as Flash drives. Building on the five nines of reliability of the CX3 series, it supports *Linux*, *Windows*, Solaris, *HP-UX*, *AIX*, and *VMware*, and *Hyper-V* environments.

Moreover, the CLARiiON CX4 has several major new features.

UltraFlex Technology

Let's begin with the front-end storage processor. The CLARiiON CX4 has a new *UltraFlex* architecture that effectively separates the I/O complex from the CPU and memory. This means I/O ports are no longer hardwired to the storage processor, and users have the flexibility to plug in their choice of I/O modules to suit their requirements. EMC offers two types of I/O modules today:

- 2 ports of 1Gbit/s iSCSI
- 4 ports of 4 Gbit/s Fibre Channel

The modules are hot pluggable and hot swappable and can be mixed and matched. CLARiiON CX4 systems ship with a base configuration, as indicated in Figure 1 below, to which customers can add connectivity. The total slots per system range from 6 to 12, depending on the model, for a maximum of 16 iSCSI or 24 Fibre Channel ports in a CX4-960. This is three times higher than the largest CLARiiON CX3 model.

In the future, expect EMC to introduce I/O modules with other options, such as 8 Gbit/s Fibre Channel, 10 Gbit/s iSCSI, and perhaps protocols like FCOE (i.e., Fibre Channel over Ethernet). The modularity of UltraFlex means that the storage systems can adapt to future requirements, which extends their value and useful life.

Performance Improvements

Continuing with enhancements to the storage processor, the CLARiiON CX4 has several new features that improve performance. Powered by Dual Core and Quad Core Intel Xeon processors, CX4 can process more data and consume less power per core than its single-core predecessors. The *FLARE* operating system running in CLARiiON is now 64-bit, so it can also process more data per cycle. Finally, the CLARiiON CX4 has twice the system memory of the CX3 series – as much as 32 GB in the CX4-960. Additional cache improves response time because it allows the system to process more I/Os in high-speed electronic memory, avoiding the latency associated with a disk read or write.

Energy-efficient Technologies

The industry is focused on green computing today because enterprises can no longer take boundless energy supplies for granted. While denser disk drives and microprocessors consume more power per cubic foot, the ability of data centers to supply adequate power and cooling is limited. In some situations, the capacity of the electrical grid already is maximized. The data center power bill is also large enough to matter, and executives would like to mitigate it.

The CLARiiON CX4 has three new green features that conserve less power. It supports a new *low-power 1 TB SATA drive* that rotates at 5400 RPM, instead of 7200 RPM. The slower rotational speed draws less power, at a tradeoff in performance. It consumes 32% less power than the 7200 RPM 1 TB SATA drive and 96% less than the 15,000 RPM 73 GB Fibre Channel drive on a per-TB-stored basis.

Another green feature is *adaptive cooling*. Normally, cooling fans are fully on all the time. The new adaptive cooling fans turn at variable speeds and even completely off (analogous to a light dimmer) based on temperature readings inside the system. They only draw as much power as necessary to maintain an acceptable temperature. Another benefit of slower fan speeds is less noise pollution inside data centers.

EMC also pre-announced a *spin-down feature* that will be available in 2009 for the CLARiiON CX4. The software code for spin-down is already available in the FLARE operating system, and this feature is included in the Disk Library 4000 series, which is based on the CLARiiON platform. However, EMC is in the process of qualifying it for various primary storage application environments.

Spin-down is the storage equivalent of turning down the lights when no one is home. When the drives in a particular LUN are not accessed for a

Exhibit 1 – The Clariion CX4 Midrange Storage Family

	CX4-120	CX4-240	CX4-480	CX4-960
Max # drives	120	240	480	960
Max nominal capacity	120 TB	231TB	471 TB	951 TB
Cache	6 GB	8 GB	16 GB	32 GB
Base host ports	4 FC, 4 iSCSI	4 FC, 4 iSCSI	8 FC, 4 iSCSI	8 FC, 4 iSCSI
Max host ports	12 FC or 8 iSCSI	12 FC or 10 iSCSI	16 FC or 12 iSCSI	24 FC or 16 iSCSI

Source: EMC

Copyright © 2008 by The Clipper Group, Inc. Reproduction prohibited without advance written permission. All rights reserved.

user-defined period of time, the system will place the drives in sleep mode to save energy and reduce heat dissipation. If there is a read request at a later point, the system will turn them back on. All drives can be powered and accessed simultaneously.

Flash Drives

The CLARiiON CX4 will support ultra-fast flash drives, like the ones introduced in the high-end *Symmetrix DMX-4* family earlier this year, beginning in October 2008. Flash is a form of electronic memory that is at least an order of magnitude faster than disk drives, depending on the metric considered. It also has low power consumption. EMC's flash drives have a special parallel architecture and intelligent media management that allow them to be robust and have exceptionally fast throughput and application response time. In fact, they deliver more than 30 times more IOPS than equivalent capacity 15,000 RPM Fibre Channel drives. In other words, one flash drive is equivalent to the performance of 30 disk drives. At the same time, flash drives consume 38% less power per TB and 98% less per IOP. Also, because they do not have moving components, the flash drives run quieter, weigh less, and have a much improved reliability profile.

These ultra-fast, low-power flash drives effectively create a storage "tier 0" for applications, such as online transaction processing for financial services, that require a very high throughput and very fast response time to complete their work in a timely fashion. These are situations where time really is money and investing in extra performance is worth it. The most relevant cost metric for these workloads is *cost per IOP*, and flash drives deliver the best result on that score.

The flash drives have the form factor and interface of a Fibre Channel hard drive and come in 73 GB capacity at initial release, with larger capacities of 146 and 300 GB to follow in the future. By integrating them into the CLARiiON CX4, flash drives can leverage the platform's data protection and management features, such as *MirrorView*, *SnapView*, quality of service management, and virtual provisioning.

Virtual Provisioning

Another new capability available in October 2008 is *virtual provisioning*. This includes a feature commonly known as *thin provisioning*, or the ability to present an application with more capacity than is physically allocated in the storage system. As data is written, the system automatically and non-disruptively increases the physical allocations from a shared pool. The result is less overhead or idle capacity, because the physical pool is stretched to cover more volumes, because the need to over allocate physical storage – a common practice – just to ensure that there always will be enough, has been eliminated. Thin provisioning cuts costs by reducing the number of disks that need to be purchased and their associated power, cooling, and floor space. It also simplifies the provisioning process.

EMC gives customers more choice by including thin provisioning as well as traditional LUN provisioning under the umbrella of "virtual provisioning." This gives users the flexibility to deploy traditional LUNs or thin LUNs and easily migrate between the two options, based on their application requirements. They can also apply CLARiiON's advanced capabilities to both, including *Navisphere QoS Manager*, *Navisphere Analyzer*, and snapshots.

RecoverPoint Integration

The CLARiiON CX4 series is tightly integrated with EMC *RecoverPoint*, which provides asynchronous local and remote replication and continuous data protection (CDP) for fast, DVR-like restores. A RecoverPoint splitter is embedded in the FLARE operating system, so the CLARiiON system can send a copy of each write operation to a RecoverPoint appliance for replication. Any host server connected to the CLARiiON can take advantage of this form of data protection, whether connected via Fibre Channel or iSCSI. VMware virtualized environments are also supported, including *VMware Site Recovery Manager*. The benefits here include faster recovery to any previous point in time, bandwidth reduction across the WAN, and disaster recovery for heterogeneous hosts and applications.

Conclusion

Fans of the CLARiiON midrange storage family will be pleased with the next-generation CX4 series. It delivers up to double the scale, performance, and connectivity while offering greater power-efficiency, I/O flexibility and future readiness, ultra-fast flash drives, efficient use of capacity with thin provisioning, and a great data protection option via RecoverPoint. This is a serious platform for storage consolidation and is designed to address current customer concerns, such as cost of ownership, high availability, and energy efficiency.

If you are looking for solid midrange storage with just about any feature you might expect or hope for, you should definitely consider the CLARiiON CX4 series.

Copyright © 2008 by The Clipper Group, Inc. Reproduction prohibited without advance written permission. All rights reserved.

About The Clipper Group, Inc.

The Clipper Group, Inc., is an independent consulting firm specializing in acquisition decisions and strategic advice regarding complex, enterprise-class information technologies. Our team of industry professionals averages more than 25 years of real-world experience. A team of staff consultants augments our capabilities, with significant experience across a broad spectrum of applications and environments.

- ***The Clipper Group can be reached at 781-235-0085 and found on the web at www.clipper.com.***

About the Author

Michael Fisch **is Director of Storage and Networking for The Clipper Group.** He brings over 12 years of experience in the computer industry working in sales, market analysis and positioning, and engineering. Mr. Fisch worked at EMC Corporation as a marketing program manager focused on service providers and as a competitive market analyst. Before that, he worked in international channel development, manufacturing, and technical support at Extended Systems, Inc. Mr. Fisch earned an MBA from Babson College and a Bachelor's degree in electrical engineering from the University of Idaho.

- ***Reach Michael Fisch via e-mail at mike.fisch@clipper.com or at 781-235-0085 Ext. 211. (Please dial "211" when you hear the automated attendant.)***

Regarding Trademarks and Service Marks

The Clipper Group Navigator, **The Clipper Group Explorer**, **The Clipper Group Observer**, **The Clipper Group** *Captain's Log*, **The Clipper Group Voyager,** Clipper Notes, and *"clipper.com"* are trademarks of The Clipper Group, Inc., and the clipper ship drawings, *"Navigating Information Technology Horizons"*, and *"teraproductivity"* are service marks of The Clipper Group, Inc. The Clipper Group, Inc., reserves all rights regarding its trademarks and service marks. All other trademarks, etc., belong to their respective owners.

Disclosure

Officers and/or employees of The Clipper Group may own as individuals, directly or indirectly, shares in one or more companies discussed in this bulletin. Company policy prohibits any officer or employee from holding more than one percent of the outstanding shares of any company covered by The Clipper Group. The Clipper Group, Inc., has no such equity holdings.

Regarding the Information in this Issue

The Clipper Group believes the information included in this report to be accurate. Data has been received from a variety of sources, which we believe to be reliable, including manufacturers, distributors, or users of the products discussed herein. The Clipper Group, Inc., cannot be held responsible for any consequential damages resulting from the application of information or opinions contained in this report.

Copyright © 2008 by The Clipper Group, Inc. Reproduction prohibited without advance written permission. All rights reserved.