



Vmirror™ + Vmeter™

Solution Overview:

Protect your Video Workflow from Disruption

October 2011



Protecting workflow disruption for video post-production & creative environments

As studios around the world know, Apple digital production solutions from Final Cut Pro to Xsan storage infrastructure are revolutionizing video content workflow. Users can go from video feed to editing and playout faster than ever before, thanks to shared access and digital editing capabilities that enable concurrent access to terabytes of digital video from anywhere on a Fibre Channel storage network.

With these new capabilities have also come new demands for more content editing, and quicker turnaround times. Video editing and distribution have become “mission critical.” Protecting work-in-progress and guaranteeing access to the video content is no longer just an option. Fortunately, there is an answer: with the simple addition of Vicom Systems’ Vmirror appliance, you can add high-performance, easy-to-manage, bulletproof access to your Xsan storage. Vicom’s Vmirror solution is a sensible way to ensure Xsan content is continuously protected and available, avoiding costly downtime or workflow interruptions.

Key reasons causing video workflow disruption:

- Hardware component break/fix
- Software code upgrade
- SAN I/O congestion
- System problem diagnosis and verification

Vmirror™ Appliance

Vmirror is a purpose-built, solid-state, Fibre Channel appliance that routes and transparently mirrors video content, from DV to uncompressed HD video, on Xsan at multi-gigabytes per second. Need higher throughput? The Vmirror architecture scales up in both performance and availability: each Vmirror appliance comes equipped with a two clustered engines (hardware-mirroring) for continuous data protection that move data at 600 megabytes per second. Vmirror’s clustered operation also ensures you have access to your content in the event of a storage outage: two internal data paths to your mirrored video content means no single point of failure can cause downtime. Vmirror appliance hardware mirroring instantly fails over* to alternate storage without production workflow interruption — a key requirement for large video collaboration workgroup applications. This feature brings tier-1 storage functionality to tier-2 storage systems, the common choice for Xsan customers.

* Vmirror appliances are designed to failover in less than one second. Actual performance may vary with application, connection bandwidth, and server/storage configuration. Where failover timing is critical, Vicom recommends testing for actual performance.

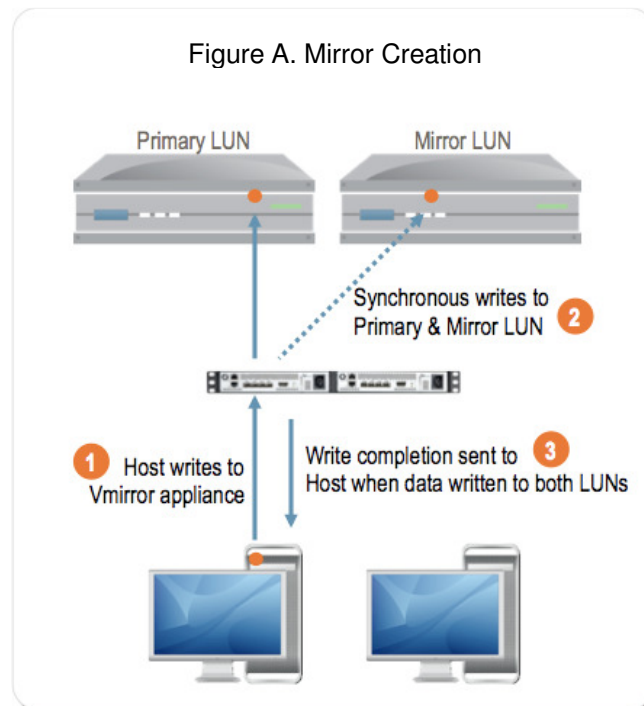
Performance and Scalability

Each Vmirror engine is an independent system, complete with its own real-time operating system and integrated hardware designed to move data at FC line speeds. Vmirror engines have been built for easy scalability: a modular, clustering architecture enables performance and availability to be expanded in building-block fashion through the addition of more engines. In video applications, where high throughput is paramount, a two-engine appliance is recommended for 4 FC RAID systems. For large-scale operations, multiple Vmirror appliances can be used to create a large cluster for higher levels of performance and availability.

Figure A illustrates how the Vmirror appliance creates an identical, block-for-block mirror of the Primary LUN:

1. *Data is sent from host system to the Vmirror appliance*
2. *Vmirror writes synchronously to Primary and Mirrored LUNs*
3. *To ensure LUN data consistency, the Vmirror does not notify host system of completion until data has been written to both LUNs.*

Each LUN is an identical “twin” of the other, and in the event of a LUN failure, the Vmirror appliance continues to use the remaining available LUN for data access without affecting host system operation.

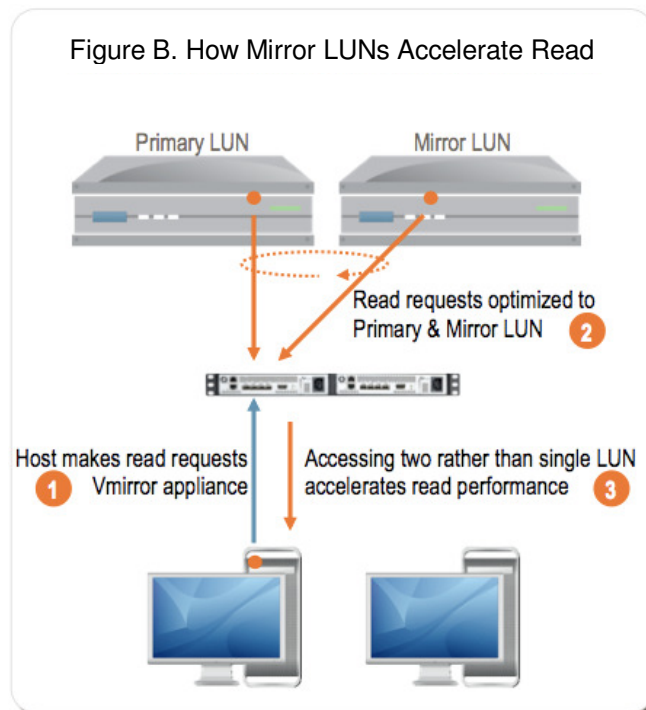


Because the Vmirror appliance uses high-speed, internal hardware routing to both read and write data, if the Primary LUN becomes unavailable, access is instantly shifted to the Mirror LUN. Since the Mirror LUN is identical to the Primary LUN, failover to the alternate LUN is instantaneous and imperceptible to the host system.

Figure B illustrates how, in addition to simplifying failover, Vmirror uses twin LUNs and hardware-driven FC access to accelerate the “read” performance of the video storage.

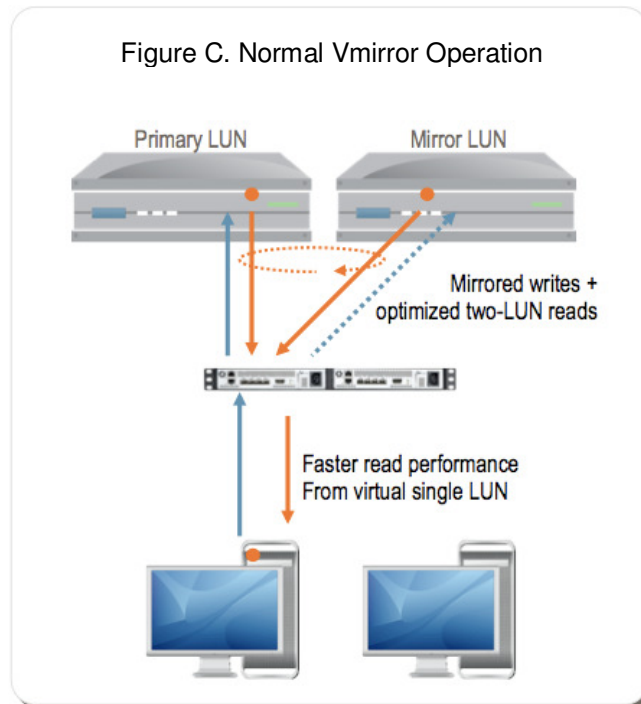
1. *Host system makes read request to Vmirror appliance*
2. *Vmirror alternately sends read requests from host systems to Primary and Mirror LUNs in round-robin fashion.*
3. *Ability to access two, rather than a single, LUN speeds up read response to host system(s). Host systems experience higher performance.*

In video content production, the ability to read from two identical LUNs can offer a large performance advantage over single-LUN reads, which can slow host systems access as multiple large video files are read from a single LUN. Depending on the application and number of host systems, additional Vmirror appliances may be added to increase overall throughputs.



High Availability and Continuous Data Protection

Vmirror uses hardware mirroring between two FC RAID LUNs to replicate data and provide instantaneous access to the Mirror LUN in the event that the Primary LUN becomes unavailable. As depicted in Figure C, to the host systems, the Vmirror-protected LUNs appear as a single, multipath, logical storage unit. In effect, the Vmirror connected storage pair behaves as a combined, fast, “unbreakable” LUN.

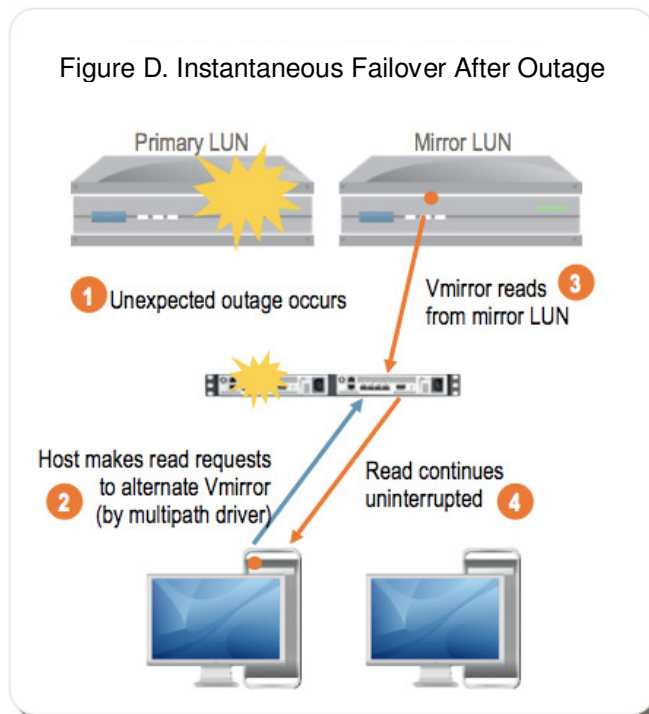


To the host systems, a single or clustered Vmirror appliance appears as a single, active-active storage system, while from a physical standpoint, Vmirror-protected FC RAID arrays may actually reside in different physical locations — providing an additional degree of protection in case disaster strikes at the primary storage site. Compared to a single-engine appliance, a two-engine Vmirror appliance doubles throughput, and adds redundant data paths and components, ensuring that no single point of failure can cause downtime.

To illustrate how Vmirror achieves instantaneous failover, Figure D shows the sequence of events following an outage of the Primary LUN and/or Vmirror engine:

1. *Vmirror engine and/or Primary LUN fail*
2. *The host system multipath driver senses the failure, issues a read to alternate Vmirror engine*

3. Vmirror engine hardware routing sends read to the Mirror LUN.
4. Read continues uninterrupted.



Progressive System Software Upgrade:

With Vmirror, the customer has an option to break the mirror LUNs as a "frozen copy" before major system software upgrades. The "frozen copy" would be used as a quick fallback point when needed.

Mirror LUNs would be re-synced after the upgrade is proven to reclaim the high availability configuration.

High availability Made Easy

Vmirror appliances make mirroring installation and management a snap. Because mirroring is performed on the appliance rather than host systems, no installation of mirroring software or special drivers is required. Instead, installation is performed just once using Vmirror Admin, making installation as easy as a couple of mouse clicks. Once the mirrored arrays are activated, Vmirror-protected storage becomes immediately accessible to all connected host systems.

Vmirror appliances save you more than just installation labor. Management is reduced because the Vmirror appliance shields host system operation from storage controller failures and the associated storage re-build process. In the event that a re-build is required, Vmirror continues to provide access to the mirrored storage until the process is completed. When the primary storage is fully restored, Vmirror shifts host systems access back to the original mirrored operation. All changes are automatic and fully transparent to connected host systems, and require no operator intervention.

Application 1:

Grid Structured Tier-1 Video SAN for Post-Production

The digital media post-production environment depends heavily on collaborative workgroup and workflow, which in turn requires shared access to large stores of content ranging from DV to uncompressed HD video. For storage systems, this translates into high throughput, concurrent data access, and implicitly, high storage system availability.

Shown in Figure E below is a recommended configuration of Vmirror-enabled, grid structured, tier-1 video storage that assures high availability needs of an enterprise post-production environment.

Each Vmirror/storage cluster is guaranteed 600 megabytes per second of sustained data throughput, even under any single point of component failure, or when offline for services, an important safeguard for deadline-driven work.

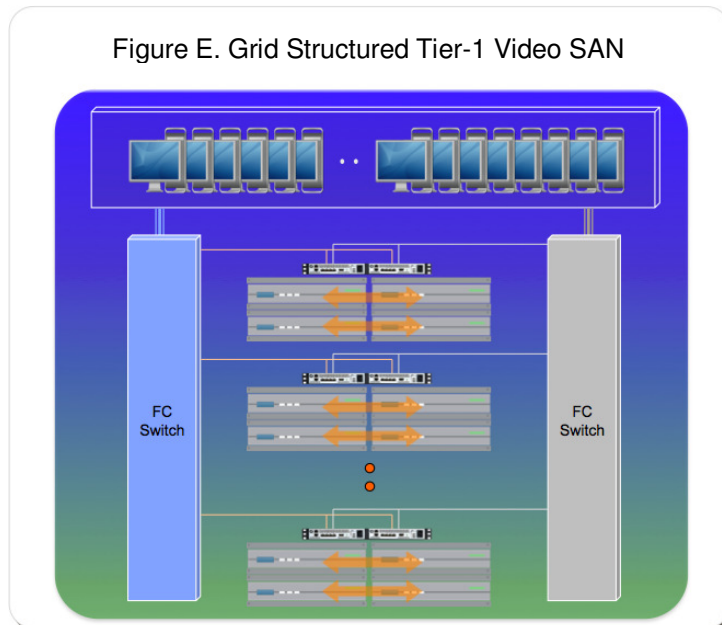


Vmirror-Storage Building Block

A single Vmirror appliance is recommended to mirror two pairs of FC RAID systems to achieve the best video performance with high-availability. Additional Vmirror-Storage may be added for higher performance and capacity in large-scale Xsan deployments.



Figure E. Grid Structured Tier-1 Video SAN



Application 2:

Real-time Xsan Volume Replication over Campus

Uninterruptible ingest, playout, reliable content sharing, and quick turnaround are all key requirements of contemporary rich media data sharing applications.

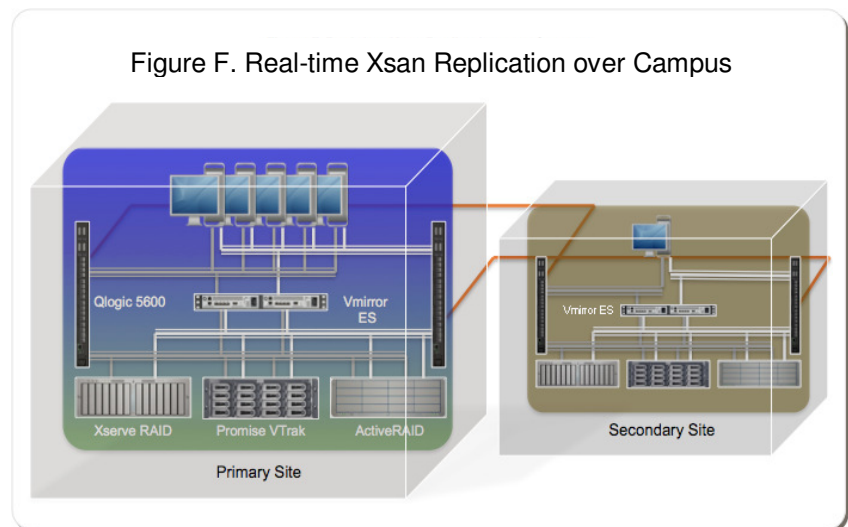
Apple Xsan solutions combined with the assured content access of Vmirror appliances are the answers. Figure F illustrates a real customer configuration for a typical rich media content sharing environment, which incorporates a pair of Vmirror appliances replicating block data synchronously over Fibre Channel — with the benefit of continuous critical data protection over distance, instant failover/failback, and enhanced read performance in multi-user access situations.



Vmirror Options

A compact, 1U rack mountable enclosure package holds up to two Vmirror engines and supports up to 8 mirror pair of FC RAID systems.

Vmirror clustered engines, for high availability, may be configured in separate enclosures for distance volume mirroring.



Vmeter™ SAN Quality Management

Even in a perfectly normal operation, video workflow can be unexpectedly disturbed by burst operations temporarily overloading your centrally shared SAN. While Vmirror protects against workflow disruptions due to hardware failures, repairs, and upgrade activity, Vmeter protects the disruption of workflow due to SAN congestion – the I/O traffic jam on your Xsan storage.

In a typical Apple Xsan environment, multiple video workstation clients connect to the same SAN storage pool, each with direct access to the storage devices through the SAN.

Vmeter Key Features

SAN QOS Management

- Ensures adequate bandwidth is available to high-priority video tasks by pacing Xsan client I/O access rates
- Eliminates unexpected I/O bursts
- Increases Xsan bandwidth efficiency and number of clients that can be attached to a single SAN

Easy Installation

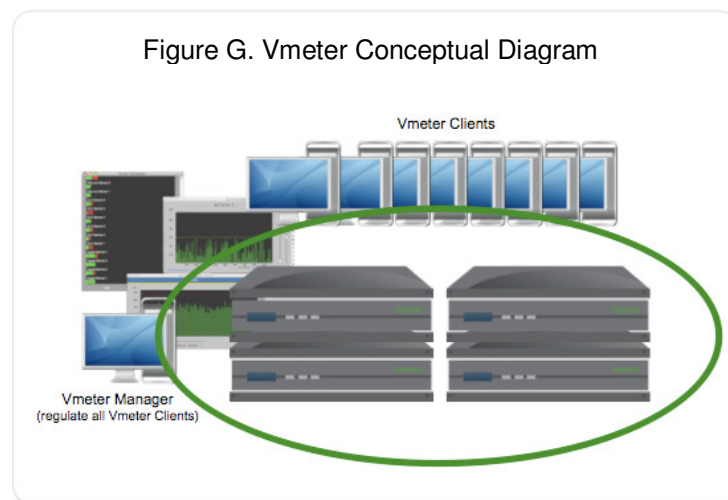
- Compact application installs on Xsan attached clients

Simple Configuration and Management

- Client I/O limits and I/O statistics are set once and applied automatically across SAN.

Direct SAN connection can increase individual system performance by eliminating I/O bottlenecks at the file server, but this can also introduce potential problems when workstation access priorities conflict and degrade overall SAN efficiency. Low priority tasks (e.g. inventory checking, quality checking, backup, etc.) can compete against high priority tasks (e.g. ingest, playout, etc.) and may cause dropped video frames due to increased I/O delay.

Vmeter SQM (SAN Quality Management, see Figure G) resolves this issue by controlling the I/O access rates of SAN attached workstations. When high-priority processes such as playout are running, Vmeter SQM ensures sufficient streaming bandwidth is available by pacing lower-priority SAN clients with administrator-specified, maximum SAN access rates. Through the simple addition of software, Vmeter SQM reduces the need for extra storage bandwidth by better controlling the quality of service (QOS) on the existing Xsan.





Solution Overview

Protect your Video Workflow

The Best Price-Performance Solution

Vmirror and Vmeter are priced to match the breakthrough value-pricing of Apple Xsan solutions. The combination provides tremendous value to video SAN system, unbeatable against any other enterprise video storage solution which offers equivalent high-availability and performance.

Vicom Video SAN Solutions guarantee the lowest cost, highest value, and best vendor support!

For more information on Vicom Video SAN solutions, please contact: vmirror@vicom.com



Vmirror™ 8G Specifications

Models	SM8x4-1. Single-engine 1U appliance with four 8Gb/s FC ports SM8x4-2. Two-engine 1U appliance with eight 8Gb/s FC ports
Host System Support	Mac OS X, Windows, and Linux
SAN File System Support	Xsan, StorNext, metaSAN
Storage System Support	Xsan-compatible FC RAID, including Apple Xserve RAID, Promise VTrak E-Class, and ActiveRAID ES. (Other storage can be certified and supported by request)
Engine Hardware	CPU: Intel IOP341 Memory: 1G DDR II
Fibre Channel Connectivity	Quad 8Gb/sec Fiber Channel ports per engine module Protocol/Topology Standards: ANSI Fiber Channel (FC-PH, FC-PH-2, FC-PH-3, FC-PLDA, FC-FLA) ANSI Fiber Channel Arbitrated Loop (FC-PLDA, FC-AL, FC-AL-2) ANSI Fiber Channel Fabric (FC-FLA, FC-GS-2) Classes of Service: Class 3 Data Transfer Rate: 1, 2, 4, or 8 Gb/sec Port Type: N(L)_Port
Serial Port Connectivity	Protocol: Serial Transmission Speed: 115200 baud Connector DB-9
Ethernet Port Connectivity	Dual 1Gb/sec Ethernet ports Protocol: Transmission Control Protocol – Internet Protocol (TCP-IP) Speed: 10/100/1000 Base-T Connector RJ-45 Compatible Vicom SAN Mirroring Console management software package (Windows GUI & CLI), Telnet, FTP
Operating Environment	Operating Voltage 100 to 240 VAC; 50 to 60 Hz; 2A at 110–120 VAC and 1A at 220–240 VAC Power Usage 56 W maximum continuous power Operating Temperature +5C to +40°C (41 to 104°F) Humidity 8% to 80% (non-condensing)
Mechanical	Weight SM8x4-1: 8.9 pounds (4.04kg) SM8x4-2: 12.8 pounds (5.81 kg) Dimensions 1U rack-optimized 1.75 inches (4.445 cm) high 17.7 inches (44.96 cm) wide 13.25 inches 33.66 cm) deep Integrated power supply with dual fan per engine module Front-to-back air pattern
Maximum Throughput	SM8x4-1 – 1,000 MB/sec, 50K IOPS SM8x4-2 – 2,000 MB/sec, 100K IOPS
Safety Standards	UL 60950 IEC 60950 EN 60950
Emission Standards	FCC Part 15, Class A ICES-003 Class A VCCI Class A EN 55022 Class A



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