

“HURRICANE-PROOF” DATA PROTECTION

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EXECUTIVE SUMMARY

How does a midsized construction company with 300 employees working across 30 active construction sites and depending on remote data access stay operational even in the midst of “hurricane country?” That is a question the staff at Moss & Associates set out to answer after Hurricane Wilma—the most intense hurricane ever recorded in the Atlantic basin—wreaked havoc across Florida in 2005 and shut down operations for days.

“We were actually in the process of moving our company into a new building when Hurricane Wilma struck. We were without power for several days and our operations took a substantial hit. During that time, we did some self-examination to understand how we could prevent this type of standstill in the future,” says Bill Snow, director of IT at Moss & Associates.

With the Compellent® Storage Center™ storage area network (SAN) and Remote Instant Replay™ software as the catalysts for heftier business continuance, Moss & Associates implemented a resilient disaster recovery (DR) plan that can be activated remotely. This white paper examines how the construction company created seamless access between two locations with a proven ability to run off the secondary site for any period of time during an emergency—all while simplifying storage administration.

About Moss & Associates

Moss & Associates is a fast-growing national construction consulting and management firm based in Fort Lauderdale, Florida. The company has quickly grown from a handful of employees to a staff of 375 who work at headquarters and across dozens of active construction locations, helping to generate more than \$750 million in annual revenue. With prosperous business growth comes the inevitable need for more data storage capacity—exponentially more.

Large construction projects often run for three or four years, and Moss & Associates wanted to maintain project data online to save time when estimators need to reference older projects in order to estimate new jobs. Moss & Associates is also required to retain correspondence such as e-mail for legal reasons. The existing environment did not support long-term and cost-efficient storage expansion. Moss & Associates selected Compellent Storage Center for its premium mix of features and limitless scalability, relying on Compellent’s Data Progression to automate tiered storage and Compellent’s Data Instant Replay to capture hourly snapshots for quick data restores.

The Impetus for Better Business Continuance

When disaster struck in the form of Hurricane Wilma, Moss & Associates was one of more than three million facilities without power for several days. The company had been in the process of moving its headquarters to a new location when the hurricane swept across the state. Emergency generators at corporate headquarters were unable to provide a stable power source, causing some damage to a main server. By the time electrical power was restored, the IT team was analyzing how to prevent a colossal shut down of operations in the future.

“First we purchased a giant generator, then we got to work on constructing a “hurricane proof” disaster recovery plan for our nearly 20 TB of data. We estimated the cost of downtime for our company to be thousands of dollars per minute. When we cannot stay operational, we also impact construction schedules,

leading to significant ripple effects, none of which are good for business. And if we can't process data, our company is dead in the water," says Snow. "What we did not know at the time was that a key part of our disaster recovery plan was already part of our data center."

Snow is referring to the Compellent SAN that had recently been purchased primarily to help the company scale with business demands. While the SAN is able to scale in performance, total storage capacity, and system availability, it also is equipped with a full suite of replication capabilities to continuously protect data. As a result, the existing Compellent SAN offered a way for Snow to achieve maximum data availability by replicating continuous Replays to a secondary SAN site that would be established.

Constructing the Disaster Recovery Plan

To keep the business up and running during emergencies, Moss & Associates designed a comprehensive disaster recovery plan based on Compellent's Remote Instant Replay. Designed to alleviate business continuance gaps with uninterrupted data protection, Remote Instant Replay provides cost-effective replication over either Fibre Channel or IP using existing networks—a key goal of Snow's plan for minimizing costs. Other goals included high data availability for users at the Fort Lauderdale and field locations, live testing capabilities that would be transparent to operations, and the ability to failover remotely to a low-cost second site indefinitely.

Snow knew it would be essential to acquire a complete view of the storage environment and wanted an easy way to effectively manage the new disaster recovery framework. Available with the Compellent SAN is Enterprise Manager software, offering easy management of all facets of local and remote storage administration from a single interface.

Finally, the disaster recovery plan would include a book of procedures for operating the IT environment during an outage or environment. While the company has binders to cover emergency contacts and building procedures, the section on IT was not elaborate enough for Snow's business continuance vision.

"I wanted to ensure that all of our new disaster recovery procedures are captured on paper—everything that anyone might need to activate a failover in the event that something happens to me, for example. Anyone on my staff should be able to review the book and get our operations back up and running," Snow details.

Configuring the Data Centers

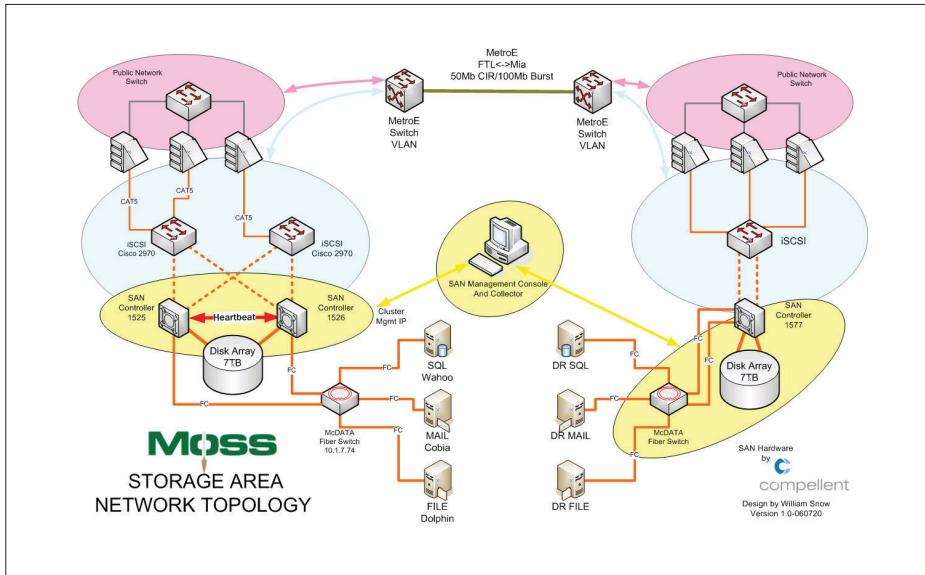
The Fort Lauderdale SAN at corporate headquarters was built for high availability with storage virtualization and Compellent dual controllers that use on-board battery backup in the event of power loss. For even greater high-availability support, Snow clustered the two controllers to provide failover at the Compellent controller level. The SAN includes high-performance Fibre Channel drives on Tier 1 and cost-effective SATA drives on Tier 2.

"We found a building in Miami and set up a smaller Compellent SAN configuration for disaster recovery. Rather than having to create an identical configuration to our main SAN, we had the flexibility to scale back the solution to keep costs low while still having continuous data protection between the sites," explains Snow.

THE LITTLE RED BOOK: BEST PRACTICES FOR DISASTER RECOVERY PROCEDURES

The IT staff at Moss & Associates believes in being prepared for anything. The red binder that holds the company's IT procedures is organized with screen shots, diagrams, legends, and detailed instructions for every aspect of protecting and restoring operations. The book is updated as server or SAN configurations change, and each member of the IT department has a copy. In advance of a natural disaster such as a hurricane, staff members take home the books and place them in secure locations. The company owner also has a binder. During an emergency, Snow or the storage administrator may not be on hand to execute procedures so the binder enables any staff member to mobilize operations.

The new disaster recovery site in Miami is built on a single Compellent controller with all SATA drives and is configured with the same amount of disk capacity as the main SAN. Snow installed a 100 Mbps Metro Ethernet link between the sites and set up asynchronous, IP-based replication for continuous data protection.



Built for Availability: Moss & Associates achieves maximum data availability and protection with a clustered controller configuration and continuous snapshots to a secondary SAN using Remote Instant Replay.

Remote Instant Replay Promotes Maximum Data Availability

Because business continuance is vital to the future of Moss & Associates, every Replay is replicated from the primary site to the remote SAN. Compellent Data Instant Replay generates the Replays on the main controller and Remote Instant Replay enables the Replays to be transmitted to the disaster recovery site.

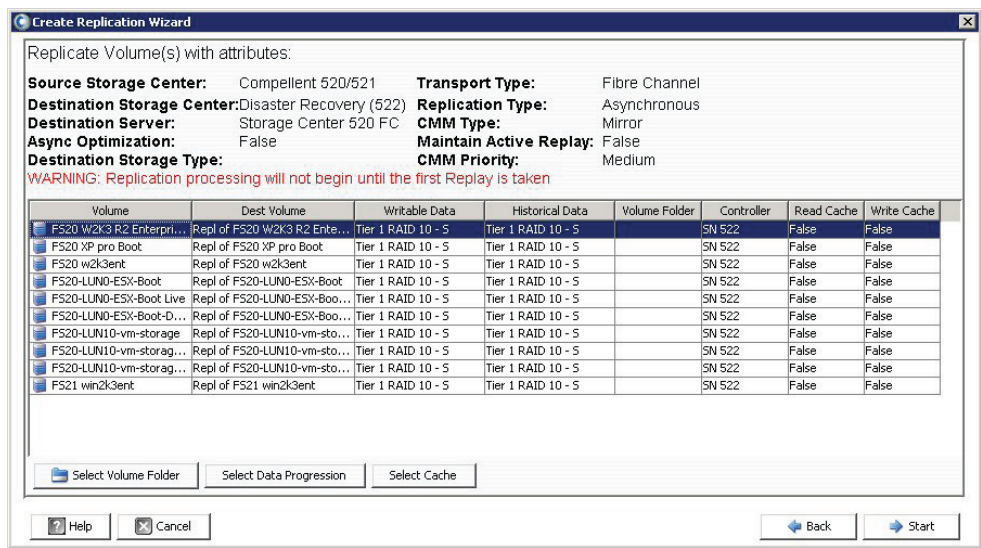
Remote Instant Replay delivers detailed granularity with no limit on the number or intervals of Replays. “Our goal is to be able to recover to the last Replay. We do Replays hourly during the day, between 7 a.m. and 5 p.m., so that if a disaster strikes or replication is interrupted, we can quickly and easily roll back to the last Replay with a 10-minute restore process rather than a lengthy search or tape restore process,” says Snow.

Moss & Associates is able to manage replication from anywhere with the help of Compellent’s Enterprise Manager software, which provides complete storage visibility from a single console with point-and-click functionality. Enterprise Manager includes sophisticated algorithms that calculate bandwidth shaping, capacity consumption, replication progress, threshold settings, I/O usage, and more to improve how and when storage resources are monitored and managed. Setting replication restore points, activating a disaster recovery site, and restoring volumes to the point of failover are all done by pointing to a SAN or volume on the screen and clicking through a short series of prompts.

“Enterprise Manager is a powerful storage resource for us. It’s how we activate replication and make it easy to manage. We have a single pane of glass that allows us to see all the systems and manage the coordination between sites,” says Snow.

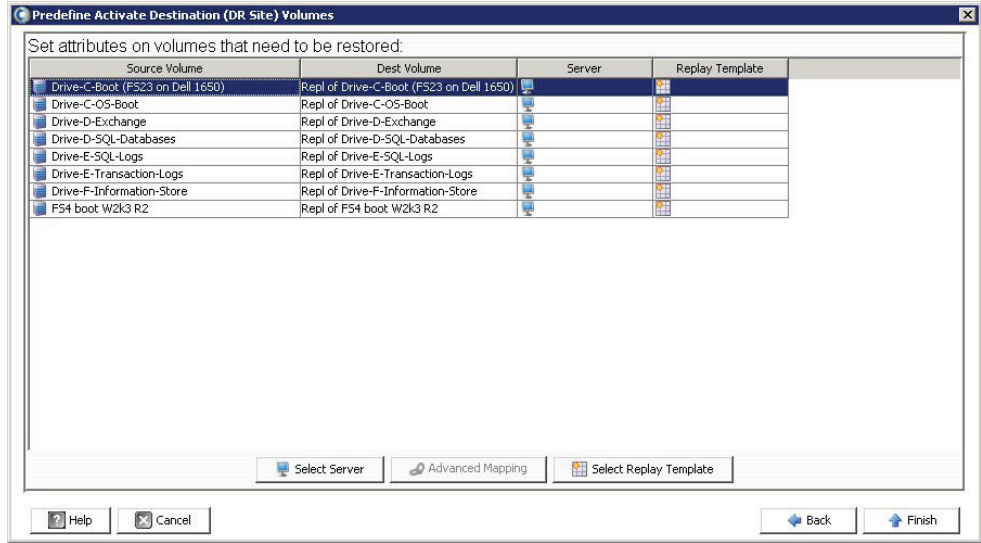
Six clicks are literally all that is required to implement remote replication configurations or transparently verify disaster recovery online while the replication is still in progress. Using Enterprise Manager’s wizard-driven interface, Moss first selects the SAN to replicate volumes to, in this case, Miami. Then, he selects the SAN to replicate volumes from, which is the Fort Lauderdale SAN. A list of all the volumes on the Fort Lauderdale

SAN is displayed in a matrix along with the size of each volume, the type of action being taken and the status of the action's progress. Moss clicks on the volumes he wishes to replicate from Fort Lauderdale to Miami and the attributes for each volume, then clicks to view and confirm his choices. To activate the replication process, Moss clicks on the start replication button.



Automated Replication: *In six clicks, Moss & Associates can start replicating volumes.*

For Snow, it also takes just minutes using Enterprise Manager to adeptly conduct remote access to the disaster recovery site during an emergency. “In the event of an emergency that puts our main site out of commission, we use Enterprise Manager to implement the failover. But if we have advanced knowledge of an emergency, such as a hurricane, I can use Enterprise Manager to deploy a preemptive action and move all of our volumes to the DR site, and then access the DR site remotely. In other types of disaster situations, where there isn’t advance notice and the link between our sites is disconnected—as with a fiber cut to our Metro Ethernet network—I can use any available Internet access to log on to the system and reestablish the connection remotely. And once the connection is repaired, I can use Enterprise Manager to coordinate the move back to the primary site,” he explains.



One Button Restore: *Moss & Associates can restore with the click of a button.*

Live Testing and Validation for Sustainable Business Operations

“I don’t feel like we have a disaster recovery plan until it’s been fully tested from start to finish—not just a practice failover, but being able to run off the remote site for any length of time necessary,” says Snow.

Moss & Associates conducts live testing twice annually, fully testing failover to the disaster recovery site and failback to the main site. These live tests are usually conducted over a holiday and before hurricane season. Operations are run off the disaster recovery site for a week or more, with one testing session lasting five weeks from Thanksgiving through the New Year. During most tests, the users don’t even know that they are accessing data from a remote location.

“When we test, we are trying to simulate how we’d expect the situation to be during a hurricane. We’ll go through written procedures and simultaneously take screen shots along the way to help us with debriefing as we might encounter things that we didn’t expect,” Snow explains. “Part of our live testing and validation is to get someone who isn’t familiar with the procedure to do it from beginning to end without our assistance. This is very valuable in the event of a natural disaster, for example, when the system administrator or the person who would be familiar with our storage environment may not be available.”

Bandwidth Optimization for Better Performance and Flexible Allocations

Most storage systems put the burden of managing bandwidth and quality of service (QoS) on the network switches and routers. Compellent’s Remote Instant Replay employs an elegant combination of bandwidth shaping tools to determine priorities for any number of volumes and estimate the amount of bandwidth needed without compromising performance. Drop-down menus are used to set QoS characteristics for different types of data and determine categories for how volumes should be prioritized during the replication process. Volumes are then replicated and transmitted according to these priorities, and can easily be changed as needed for ultimate flexibility and cost efficiency.

“Compellent’s bandwidth optimization features allow me to conserve bandwidth and allocate it in a way that gives us the flexibility to manage our data. It’s so easy to switch from one QoS to another or set priorities for the volumes. Without this level of functionality, we would have to put QoS characteristics on the network switches and prioritize traffic in a more hands-on way. With Compellent, we can set and forget, and it automates everything without us having to manage it in a separate network device. That’s a great feature,” says Snow.

Reducing Complexity, Costs, and Barriers to Replication

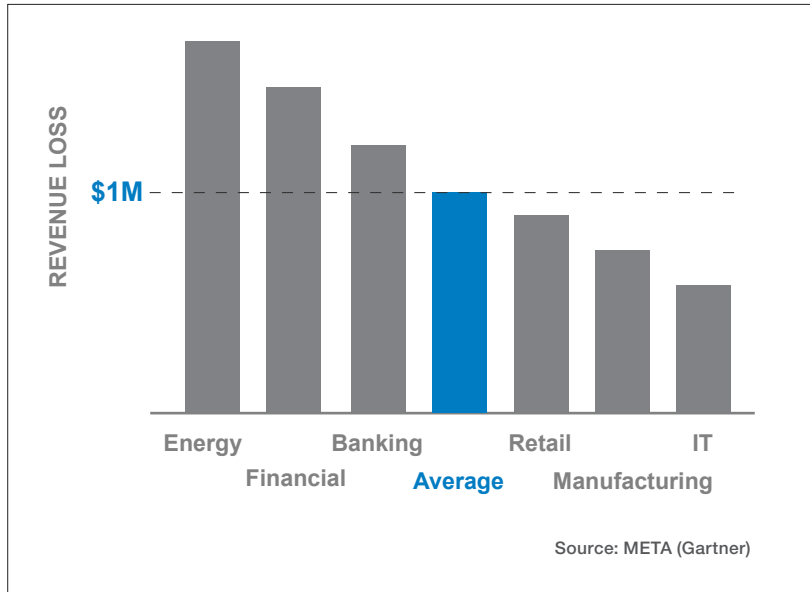
Moss & Associates has gained logistical peace of mind with a comprehensive disaster recovery solution in place that can sustain viable business operations, even in the face of a hurricane. Snow is able to manage the storage environment without the typical complexities or manual efforts because the Compellent SAN delivers intuitive automation through a single interface. Enterprise Manager provides a “command center” view of all storage systems and volumes on the SANs and nimble point-and-click functionality to execute intricate replication and storage tasks in minutes. Moss & Associates has eliminated time-consuming file searches and tape restore processes with rapid restore capabilities. Moving production data in advance of an emergency or during an outage requires little time or effort for Snow with online replication and verification prompts. And changing quality of service nodes or network traffic priorities no longer requires hands-on attention because Compellent enables set-and-forget automation.

Moss & Associates has been able to reduce costly operational and capital expenditures by mitigating inefficiencies and protocol rigidity often associated with managing large data centers. Compellent provides the flexibility for Snow to establish a recovery location using lower-cost SATA drives rather than having to duplicate the high-availability configuration of the main site. Because Remote Instant Replay allows an

unlimited number of Replays to be continuously replicated through a myriad of easy-to-change attributes and priorities, Moss & Associates is able to avoid costly downtime estimated at thousands of dollars per minute. And because Remote Instant Replay enables replication over long distances using existing Ethernet networks and is simple to initiate, Snow is able to eliminate costly conversion devices and staff expertise.

What is Your Cost of Downtime?

One of the greatest barriers to maintaining extensive business continuance is the ability to replicate and access data during or after emergency conditions. Snow is able to activate preemptive failover and disaster recovery operations by launching the Enterprise Manager application from anywhere he has Internet access.



Cost of Downtime: Average revenue loss across all US companies is estimated at \$1 million per hour due to downtime.

“Keeping our business operational, regardless of what’s happening around us, is really about the people who work for us and the clients we serve. If we don’t protect all the folks who rely on us, then we’re not really doing our job,” says Snow.

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