

## WHITE PAPER

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# Continuous Replication for Business-Critical Applications

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## EXECUTIVE SUMMARY

The number of applications and the amount of data considered mission critical within today's business environments are at an all-time high. Organizations of all sizes demand the highest levels of availability for their business applications to avoid lost revenue and reduced productivity. Many of these same organizations have long-established business continuity or disaster recovery processes in place to quickly recover from (and/or prevent) business-critical application outages. That said, complexity as a result of accelerating data growth, increased application mobility, and the proliferation of server virtualization is driving firms to rethink the way their datacenter storage resources are deployed and protected. In short, the protection and the availability of business applications have become ever more critical. However, as IT organizations evaluate availability requirements for today's critical applications, they find achieving these availability objectives via traditional methods to be a daunting task. This IDC white paper identifies how EMC satisfies businesses' increasingly stringent availability and protection requirements for business-critical applications through four storage offerings and how the tight integration of these offerings can add additional value that is greater than the sum of their parts.

## SITUATION OVERVIEW

At its most simplistic level, business continuity is the ability to maintain operations/services in the face of a disruptive event. Business continuity requires the availability of computing, application services, physical network access, and network services as well as user/client access to this infrastructure. This ability to maintain continuity in operations and services — including systems such as Web servers, email, critical databases, and so forth — requires specific technology. One of the most important technologies to consider in achieving these goals is data replication software. Replication software plays an important role in ensuring a company's ability to recover production-level data services within a stated time — commonly referred to as the recovery point objective (RPO). Customers also set the acceptable amount of time within which recovery should take place — commonly referred to as the recovery time objective (RTO). If either of those goals is not met, the IT organization needs to reexamine its objectives — and take steps to improve its recovery capability — because outages and downtime are inevitable over time. Oftentimes companies will measure RPO or RTO without focusing on how efficiently they are meeting their objectives. EMC is working to help organizations meet stringent RPOs and RTOs by leveraging the tight integration of the technology used to ensure these targets are met efficiently and cost effectively.

With these factors in mind, IDC notes that traditional options for disaster recovery or business continuity are not going to be replaced anytime soon. Rather, IDC expects the need for technologies such as storage replication and snapshots to grow over the next five years. According to *Worldwide Storage Replication Software 2011–2015 Forecast: Snapshots as a First Line of Defense* (IDC #229426, July 2011), the storage replication software market is expected to experience an impressive 7.1% compound annual growth rate between 2011 and 2015, when sales will surpass \$3.6 billion. Indeed, organizations will increasingly look to replication software to help protect a significant portion of their important data as well as create copies that can be leveraged for business analytics.

The complexities introduced through increased use of virtualization technologies and accelerated data growth are placing tremendous strain on datacenter storage resources as well as the individuals tasked with managing these resources. As such, IDC believes the way disaster recovery– or business continuity–enabling technologies such as replication software are deployed and expected to interact with each other is beginning to change materially. Most notably, IDC expects better integration of replication technologies with datacenter applications and virtual management tools as well as an increased focus on use of replication and snapshot management tools.

Business continuity concerns are expected to drive demand for improved integration of differing replication technologies as well as between replication and disk storage systems. Better integration of disk storage systems and replication technologies as well as improved management of replicated data should provide datacenter administrators with simplified deployment and management of disaster recovery/business continuity technologies while also helping drive cost reductions.

In short, users are straining under the weight of datacenter storage resources that require their constant attention and thus have a strong appetite for disaster recovery/business continuity solutions that help alleviate such pressures while also reducing capital costs. EMC is one vendor that has identified this need and has developed improved integration between datacenter storage resources and replication technologies to help its customers with such problems.

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## **Components of EMC's Disaster Recovery and Business Continuity Offerings**

EMC has been offering technologies that enable data protection, disaster recovery, and business continuity for a number of years. The company has a long-established business of providing mission-critical storage resources to the most demanding datacenters in the world and thus has a thorough understanding of the needs within this space. Leveraging this knowledge, EMC has created tighter links between a set of traditionally separate offerings with the intention of enabling reliable, efficient, and cost-effective disaster recovery and business continuity. The offerings are VMAXe, RecoverPoint, Replication Manager, and Data Protection Advisor. This section provides brief descriptions of these products, followed by an overview of the benefits enabled by the integration of each. It's important to note that the EMC products mentioned in this paper are just some of the company's offerings that support disaster recovery and business continuity.

## ***VMAXe***

VMAXe is a disk storage system that was launched by EMC in the summer of 2011. The array is technically a member of the company's flagship Symmetrix family of enterprise-class disk storage systems, but it's a new category of storage for EMC. VMAXe is designed to be utilized within environments that require Symmetrix reliability, availability, and performance but on a smaller scale and at a lower price point. VMAXe also is a fit for customers that require the benefits afforded by a multicontroller array and provides an easier set of operations for managing and provisioning their storage. The VMAXe's scale-out, highly virtualized architecture positions the VMAXe between the high-end VMAX storage array and the dual-controller, modular architecture of the VNX series arrays.

For remote replication, VMAXe customers have the option to select SRDFe for more traditional array-based replication or to use RecoverPoint for network-based continuous data protection. SRDFe is a modified version of EMC's remote replication software known as Symmetrix Remote Data Facility, or SRDF. SRDFe offers many features found on SRDF (e.g., replication over extended distances, replication to older Symmetrix arrays, synchronous or asynchronous replication options) but is designed specifically for use with VMAXe.

RecoverPoint has a native write splitter integrated within the VMAXe, which enables:

- Continuous local and remote replication
- Synchronous, asynchronous, and dynamic synchronous remote replication
- Integrated WAN bandwidth deduplication and compression

VMAXe is preconfigured and built to order, which greatly simplifies procurement and installation. EMC has stated that the VMAXe can be installed and running production applications within four hours.

## ***RecoverPoint***

RecoverPoint is EMC's network-based replication technology that provides heterogeneous, continuous replication/data protection capabilities. RecoverPoint enables granular recovery for applications from logical corruption through a large number of point-in-time images. Supporting replication between heterogeneous, dissimilar arrays is one of the strongest attributes of network-based replication solutions because it helps reduce costs (in part) by eliminating the need for replication to occur between identical storage resources. The RecoverPoint splitter within VMAXe splits application write I/O simultaneously to the primary storage array and to the RecoverPoint appliances (RPAs). This write splitting is performed without host agents and transparently to the application. In addition, RecoverPoint provides network cost savings through WAN bandwidth reduction via integrated deduplication and compression capabilities.

### ***Replication Manager***

Replication Manager (RM) provides centralized management of the replication capabilities provided by EMC through a single console. Replication Manager supports all EMC arrays, including Symmetrix (VMAX/VMAXe), VNX/VNXe, CLARiiON, and Celerra. In addition to integration with replication technologies such as SRDFe, Replication Manager supports RecoverPoint, providing multiple options for data protection, including automated RecoverPoint snapshots (referred to as bookmarks by EMC) and continuous data protection in physical and virtual environments. RM also integrates with datacenter applications such as Exchange, SQL Server, and Oracle to provide application-consistent replicas of these applications. RM eliminates the need for scripting by providing GUI-based wizards to perform important replication tasks such as creating replication sets, scheduling snapshots or replication jobs, and restoring copies to production in the event of data loss.

### ***Data Protection Advisor***

Data Protection Advisor (DPA) is a data protection analysis tool that monitors applications, servers, and storage resources within a replication environment. DPA provides IT administrators with the information required to monitor, troubleshoot, and optimize their data protection environments with a simple, policy-based tool. DPA allows for easy navigation through complex data protection environments to identify areas where service-level agreements (SLAs) are not being met — and determine the root cause of the shortfall. Then administrators can begin taking the corrective actions needed to optimize their resources or configurations to ensure SLAs can be met. DPA provides tools for simplified capture, monitoring, management, and reporting of complex application and replication environments, enabling real-time analysis, auditing, and chargeback.

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## **Advanced Disaster Recovery and Business Continuity Through Integration of Disparate Technologies**

EMC is well known as a company that provides a number of storage and data protection products. And while many customers will require the use of only a subset of EMC's storage offerings, it is important to note that EMC continuously invests substantial resources into the integration of its storage offerings. The company has long understood that the usefulness of a set of products can be greatly increased by tying the products together through tight integration points. This section highlights examples where EMC utilizes tight integration between its products to provide increased value within data protection, disaster recovery, and business continuity environments. Examples of integration between EMC products and third-party offerings are also included.

### ***Integration of VMAXe and RecoverPoint***

RecoverPoint has traditionally been leveraged as the primary replication technology within EMC's midrange VNX and CLARiiON array environments. While this will remain an installation choice for many EMC customers, the company has provided a new way of deploying RecoverPoint by integrating it within VMAXe. This integration greatly simplifies RecoverPoint environments and provides the following benefits:

- ☒ Environments requiring Symmetrix-class performance, scale, and availability capitalize on RecoverPoint's ability to provide heterogeneous replication, point-in-time recovery and WAN bandwidth reduction without the need to add fabric-based (also referred to as SAN-based) splitters. This should greatly reduce the cost and complexity associated with fabric splitter deployments.
- ☒ As noted earlier, VMAXe is a build-to-order array that is shipped preconfigured and includes the RecoverPoint integrated splitter. This greatly simplifies deployment of the array and the replication setup process.
- ☒ RecoverPoint's heterogeneous replication capabilities ensure VMAXe can natively and cost effectively replicate to EMC's VNX and CLARiiON arrays, which also have integrated RecoverPoint write splitters.
- ☒ RecoverPoint reduces the use of agents for ESX or the guest OS. Having the RecoverPoint splitter integrated within VMAXe is particularly helpful in virtual environments because it eliminates the need for vCenter server agents traditionally required in a host/appliance replication approach.

#### ***Integration of Replication Manager with RecoverPoint and VMAXe***

The most obvious benefit of integration between Replication Manager and RecoverPoint is the ability to manage all RecoverPoint replication services and replicas through a "single pane of glass." Indeed, with Replication Manager, users can manage complex replication environments centrally through a single console. Thus, the integration of these two products greatly simplifies the management of inherently complex replication environments. While this benefit may be the most apparent, it is hardly the only benefit of a combined Replication Manager, RecoverPoint, and VMAXe environment. Other benefits are as follows:

- ☒ Replication Manager's ability to tie into important datacenter applications from companies such as Microsoft, SAP, or Oracle provides RecoverPoint with the ability to provide application-consistent copies of data.
- ☒ The combined use of Replication Manager, RecoverPoint, and VMAXe allows IT administrators to nondisruptively create copies of replicated data that can be used for disaster recovery, business continuity, business analytics, test and development, or disaster recovery testing.
- ☒ Replication Manager enables "self-service replication" via user-based roles and privileges, which promotes workflow efficiency and saves time and money.

#### ***Integration of Data Protection Advisor for Replication Analysis, RecoverPoint, and VMAXe***

As noted earlier, DPA provides detailed tools for simplified capture, monitoring, management, and reporting of complex application and replication environments, enabling real-time analysis, auditing, and chargeback. Through deep integration with RecoverPoint, Data Protection Advisor is able to provide detailed monitoring, troubleshooting, and analysis of an organization's data protection environment. Further, Data Protection Advisor can be used as a data mining and analysis engine

by leveraging its ability to collect data within the replicated environments. Once the data is collected, Data Protection Advisor uses it to create reports that can help IT departments with planning and even enable chargeback, should they choose to head in that direction.

### ***Integration of RecoverPoint and Server Virtualization Technologies***

The benefits that datacenters can achieve from leveraging server virtualization are numerous and well documented. Three of the more common benefits of server virtualization are improved asset utilization, increased application mobility, and quicker time to application deployment. For many datacenters, another important benefit of server virtualization is simplified disaster recovery through vMotion and Site Recovery Manager (SRM) from VMware. And while many datacenters will find that these capabilities provide ample protection for their (often less complex) environments, many more will look to more feature-rich products such as RecoverPoint to help provide comprehensive disaster recovery or business continuity in their virtual environments. Not surprisingly, EMC addresses this need by leveraging VMware's vCenter APIs, which provide vCenter administrators with:

- ☒ **Greater granularity of virtual machine (VM) protection.** RecoverPoint's granular protection can be used to roll back virtual machines to any previous point in time, allowing full virtual machine recovery. When RecoverPoint is used in combination with Replication Manager, single virtual machines can be restored to production based on any RecoverPoint point-in-time copy.
- ☒ **Ability to track changes within virtual environments.** RecoverPoint will monitor the replicated VMs and provide vCenter administrators with alerts and actionable information when VMs become vulnerable or unprotected due to changes within the environment.
- ☒ **Greater visibility into replication status of virtual machines.** vCenter API integration enables detailed replication status for each VM being protected by RecoverPoint. vCenter administrators are presented with detailed information showing which of their VMs are being replicated and which are not.
- ☒ **Efficient use of datacenter infrastructure.** RecoverPoint's support of VMware Site Recovery Manager as well as VMFS and RDM/P volumes ensures users can fail over and fail back between virtual and physical resources. Disaster recovery testing is greatly simplified with VMware Site Recovery Manager and RecoverPoint, enabling easier and more frequent disaster recovery testing. Also, RecoverPoint's bandwidth reduction capabilities can help reduce network traffic when replicating virtual environments.
- ☒ **Improved visibility of protected VMs.** RecoverPoint provides replication status of each VM being replicated and can tell vCenter administrators which VMs are being protected and which are not.

## CHALLENGES

While the need for data protection, disaster recovery, or business continuity is absolutely unavoidable for many organizations, most will have some amount of flexibility when it comes to architecting, deploying, and managing such environments. Because EMC's approach involves integrating multiple best-of-breed products, the level of complexity and capital investment around the initial deployment of these solutions could put off some otherwise interested companies. Further, some organizations still rely heavily on scripts for initiating replication and managing replicas. EMC's challenge will be to successfully educate such organizations to help them better understand how the benefits of deploying the EMC solutions mentioned in this paper can provide long-term capital and operational cost savings that outweigh the benefits of continuing with an existing environment.

## CONCLUSION

Through tight integration of the technologies mentioned throughout this paper, EMC has taken individual storage solutions and increased their value to datacenter administrators considerably. At the core of these solutions are:

- ☒ VMAXe, which provides an advanced scale-out storage platform for primary data that is simple to deploy and manage
- ☒ RecoverPoint as the replication engine enabling heterogeneous, point-in-time replication for disaster recovery, business continuity, and data repurposing uses
- ☒ Replication Manager for application integration, replica management, and single VM recovery
- ☒ Data Protection Advisor for topology reporting, detailed replication analysis, chargeback, and automation

Separately, these products could be enough to support the primary storage and disaster recovery needs of most datacenters. However, when the solutions are tightly integrated with each other and third-party software from datacenter application and server virtualization providers, their value to datacenter administrators increases considerably.

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