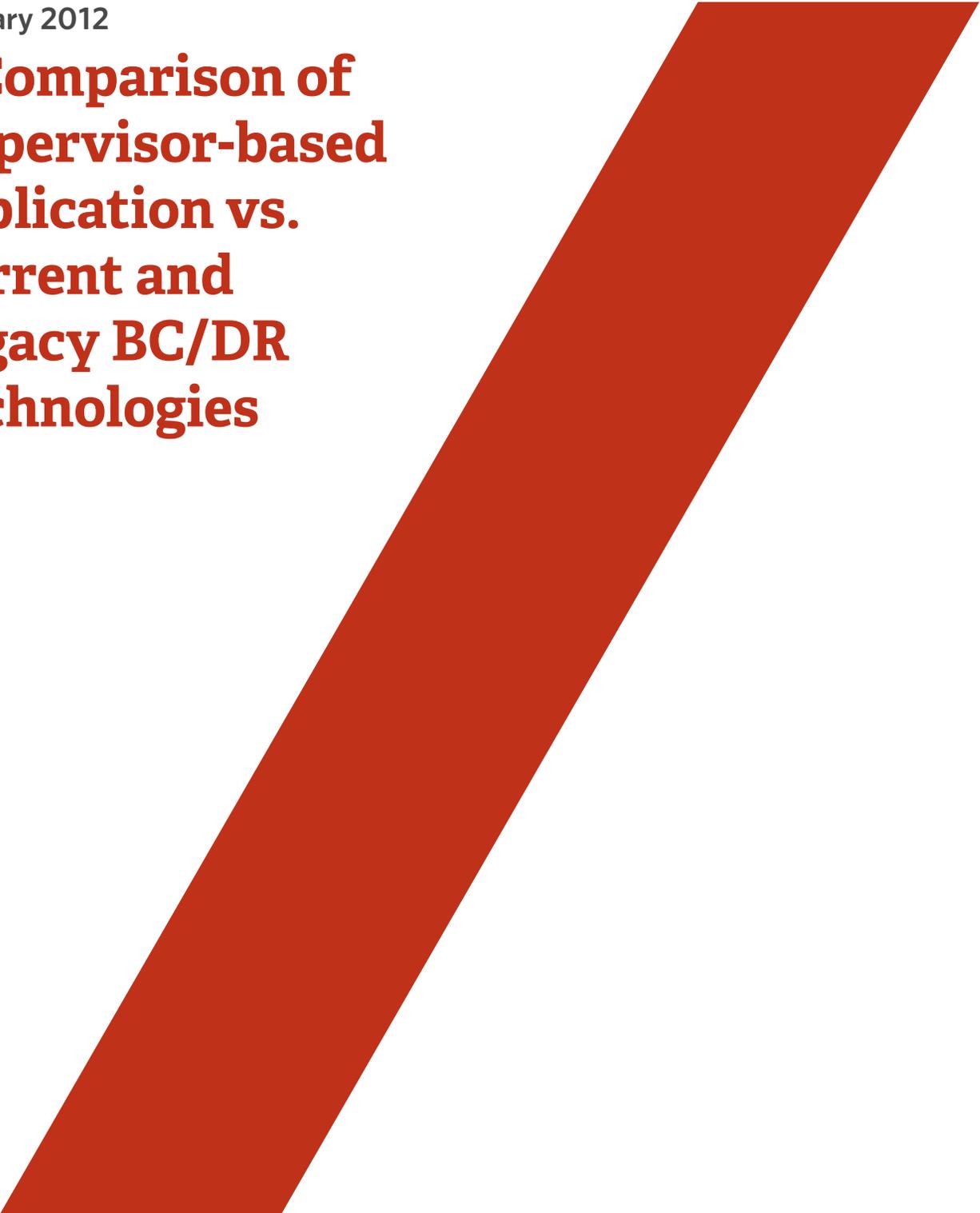


February 2012

A Comparison of Hypervisor-based Replication vs. Current and Legacy BC/DR Technologies



Overview

Zerto's innovative, hypervisor-based replication is a new technology developed to provide a true enterprise-class, yet fully virtual-aware BC/DR solution to protect virtualized, mission-critical applications.

This document outlines the fundamental differences between Zerto's hypervisor-based replication and other current and legacy technologies.

Compared Technologies

The current and legacy solutions compared in this document include:

- **Zerto Hypervisor-based Replication** – Zerto's enterprise-class, virtual-aware BC/DR technology.
- **Array-based Replication** – These products are provided by storage vendors and deployed as modules inside the storage array. This includes appliance and fiber-based replication solutions (in which the replication code runs on an external appliance and not on the storage arrays themselves) since the basic paradigm of replicating LUNs is the same. Array-based solutions can run in conjunction with VMware's SRM or without it, so we have compared the feature sets of both scenarios separately.
- **Host/Guest-based Replication** – In these solutions a replication engine is installed on each individual virtual server.
- **Snapshot-based Replication** – Replication is performed by periodic snapshots and the subsequent transfer of changed blocks over the network to a remote site.
- **VMware Site Recovery Manager with vSphere Replication** – This new hypervisor-based solution was recently launched by VMware to provide simpler and more cost-efficient replication for smaller sites and tier-two applications.

“Zerto Virtual Replication offers all the advantages of host-based replication and none of the disadvantages...Zerto offers several advantages over traditional array-based replication schemas.”

IDC Product Flash Report, September 2011



Comparison Methodology

To provide a meaningful comparison, we have categorized features into five categories that reflect the requirements for protecting virtualized applications.

- ✓ **Architecture:** Scalability to thousands of VMs, multi-site replication support, rapid deployment and hardware independence
- ✓ **Replication:** Continuous, near synchronous replication, RPO of seconds, point-in-time recovery, built-in WAN compression, acceleration and resiliency
- ✓ **Automation:** Automated failover and failback to a specific point-in-time, automated failover testing (even while protecting production VMs) and fast RTOs
- ✓ **Virtualization:** Ability to protect and recover specific VMs and create VM protection groups with block-level consistency to support vAPPs, HA, DRS, SDRS and vMotion
- ✓ **Cloud Readiness:** Rapid remote implementation, support for vCloud Director v1.5, failover and failback of vCenter to vCloud Director, and native multi-tenancy with network and data security

Comparison Matrix

Architecture	Zerto	Array-based Replication		Host/ Guest-based Replication	Snapshot- based Replication	SRM 5 with vSphere Replication
		No SRM	With SRM			
Scalability to thousands of VMs	✓	✓	✓	—	—	—
Integrated with vCenter	✓	—	Limited	—	—	✓
Multi-site replication support	✓	Some	Some	—	—	—
Tier-one, enterprise solution	✓	✓	✓	—	—	—
Flexible deployment/Layer 2 support	✓	—	—	—	—	—
Granularity – per VM recovery, protection	✓	—	—	✓	✓	✓
Software only – no additional infrastructure (WAN GW, SRM, cache)	✓	—	—	✓	✓	✓
Hardware-agnostic replication	✓	—	—	✓	✓	✓
Rapid deployment (can be installed and configured in under an hour)	✓	—	—	—	✓	—
Zero guest footprint	✓	✓	✓	—	✓	✓
Complete integration into virtualized environment	✓	—	—	—	✓	✓

Replication	Zerto	Array-based Replication		Host/ Guest-based Replication	Snapshot- based Replication	SRM 5 with vSphere Replication
		No SRM	With SRM			
Continuous, near synchronous replication (not snapshots or delta sets)	✓	✓	✓	Some	—	—
No performance impact	✓	✓	✓	—	—	—
RPO = seconds	✓	✓	✓	—	—	—
Journal (CDP-based) replication engine	✓	Some	Not supported	—	—	—
Point-in-time recovery	✓	Some	Not supported	—	—	—
Resiliency to WAN congestion and outages	✓	✓	✓	—	—	—
Built in WAN compression and acceleration	✓	✓	✓	Some	Some	—
Synchronization acceleration algorithms	✓	Some	Some	—	—	—
VM-level consistency grouping with write-order fidelity	✓	—	—	—	—	—
Bi-directional at the datastore level	✓	—	—	Some	✓	✓

Automation	Zerto	Array-based Replication		Host/ Guest-based Replication	Snapshot- based Replication	SRM 5 with vSphere Replication
		No SRM	With SRM			
Automated failover/failback to point-in-time	✓	—	—	—	Some	—
Automated failover test while protecting production	✓	—	—	—	—	—
Automated failback	✓	Some	✓	—	—	—
Automated failover test	✓	Some	✓	✓	✓	✓
Low RTO	✓	—	✓	—	—	✓
Customized re-IP during recovery	✓	—	✓	—	Some	✓
Customized recovery plans with scripts	✓	—	✓	—	—	✓
Automated failover including VM creation and configuration	✓	—	✓	✓	✓	✓
Build and manage recovery from vCenter	✓	—	✓	—	—	✓
Automated failover including VM creation and configuration	✓	—	✓	✓	✓	✓

Virtualization	Zerto	Array-based Replication		Host/ Guest-based Replication	Snapshot- based Replication	SRM 5 with vSphere Replication
		No SRM	With SRM			
No shadow VMs required	✓	—	—	—	—	—
No guest agent required	✓	✓	✓	—	✓	✓
Replicate RDM and physical RDM	✓	✓	✓	✓	✓	—
VM-level consistency grouping with write-order fidelity	✓	—	—	—	—	—
Protect specific VMs	✓	—	—	✓	✓	✓
Supports replication between vSphere v4.x and v5.x	✓	—	—	✓	—	—
Supports vAPPs, HA, DRS, storage DRS, vMotion, storage vMotion	✓	Limited	Limited	Limited	Limited	Limited

Cloud Readiness	Zerto	Array-based Replication		Host/ Guest-based Replication	Snapshot- based Replication	SRM with vSphere Replication
		No SRM	With SRM			
Supports vCloud Director v1.5	✓	—	—	—	—	—
True multi-tenancy with no duplication of infrastructure	✓	—	—	—	—	—
Failover vCenter to vCloud Director and vCloud Director to vCloud Director	✓	—	—	—	—	—
Native resource abstraction from cloud customers	✓	—	—	—	—	—
Full integration API	✓	—	—	—	—	—
Rapid remote implementation	✓	—	—	—	—	—
Bi-directional replication support at datastore level	✓	—	—	Some	✓	✓

Specific Technology Analysis

Following is a brief review of each specific technology and its structures and limitations as compared to hypervisor-based replication.

Array-based Replication

Array-Based without SRM	
Architecture	★ ★
Replication	★ ★ ★ ★
Automation	—
Virtualization	★
Cloud Ready	—

Storage-based solutions have typically provided robust replication for large enterprises; however, they impose the strong limitation of having the same storage at both production and replication sites. On top

of that, array-based replication presents the following limitations:

- Array-based replication does not have the granularity that is needed in a virtual environment. As a result, you can end up replicating data that is not critical to the business. Additionally, array-based replication is oblivious to virtual IT configuration changes and cannot support advanced VMware features, such as Storage DRS and Storage vMotion. This creates inefficiencies and even negates the benefits of virtualization, making DR manual and more complex, and rendering DR to the cloud nearly impossible.
- Array-based replication is not automated. It requires numerous points of control, multiple teams and duplicate

management consoles. Storage-based replication solutions are often complex and error-prone.

- It is complex and expensive to install, deploy and manage.
- All of these issues point to a high TCO with array-based solutions.

Array-based Replication with VMware's Site Recovery Manager (SRM)

Array-based with SRM	
Architecture	★ ★ ★
Replication	★ ★ ★ ★
Automation	★ ★ ★ ★
Virtualization	★
Cloud Ready	—

At first glance, these solutions resolve some of the issues found when using array-based solutions alone. However, they still possess all the limitations and drawbacks of array-based replication. Although

these solutions do support some automation and replication features, for the most part they are:

- Missing some basic architecture features, such as hardware independence, easy deployment and granularity (the ability to failover specific VMs).
- Complex to manage, as many solutions are still LUN and/or volume-oriented requiring LUN-based consistency grouping and complex coordination with storage teams.

- Not 100% virtual-aware because the replication and recovery of specific VMs and VM-level consistency grouping are still issues. Even support of VMware's own vAPPs, HA, SDRS, VMotion is limited.
- SRM does not support point-in-time recovery, so in cases when the array supports it, it cannot be integrated with SRM.

Host/Guest-based Replication

Host/Guest-based	
Architecture	★ ★
Replication	★
Automation	★ ★
Virtualization	★ ★
Cloud Ready	—

These software solutions need to be installed on each individual physical and virtual server. Such solutions do support heterogeneous storage, however...

- Replication features are lacking and are not a fit for large enterprises. Installing an agent on each host/guest increases overhead and greatly limits scalability in large environments. Additionally, it takes away processing power from the application that is running your business.
- Replication functionality is weak because there is no consistent, point-in-time view across multiple virtual machines. As a result, an application spanning multiple VMs cannot be fully protected.
- Automation features are weak due to lack of point-in-time recovery or automated failback.

Snapshot-based Replication

Snapshot-based	
Architecture	★ ★ ★
Replication	—
Automation	★ ★ ★
Virtualization	★ ★ ★
Cloud Ready	—

These products employ snapshots, or changed-block shipping, for replication. Such solutions often contain some degree of virtual awareness and have the advantage of being software-only, as

well as hardware-agnostic, solutions. Unfortunately, these solutions lack all enterprise-class replication features and have the following disadvantages:

- Replication features are sub-par. Snapshotting is a drain on production environments, with high RTOs/RPOs and zero application consistency grouping or point-in-

time recovery, rendering these solutions irrelevant for business-critical applications.

- Weak networking functionality. The majority of these solutions lack internal WAN resiliency, compression or acceleration. None have level Layer 2 network support.
- Automation features are lacking. These solutions do not include automated failback and are not managed from vCenter.
- Do not offer cloud-ready features, such as real multi-tenancy or vCloud Director support.

VMware's vCenter SRM 5 Together with vSphere Replication

SRM with vSphere	
Architecture	★ ★ ★ ★
Replication	—
Automation	★ ★ ★ ★
Virtualization	★ ★
Cloud Ready	—

VMware's latest offering is the industry's only other true hypervisor-based replication solution. However, it was designed for SMB and branch offices and built to replicate second-tier applications.

Using SRM with vSphere Replication lacks the following enterprise-class functionality:

- Key features of enterprise replication as it uses delta sets, creating longer RTOs/RPOs (15 minutes and more).
- Point-in-time recovery or VM-level consistency grouping for applications.
- WAN resiliency, optimization and acceleration.
- Failback, automated failover, failback and test to a specific point-in-time.
- Replication support from older versions of vSphere.
- Cloud-ready features, such as multi-tenancy and vCloud Director support.

Hypervisor-Based Replication

How does hypervisor-based replication compare?

Hypervisor-based replication from Zerto is the first solution to bring enterprise-class replication to the



Hypervisor-based Replication Technology Comparison

A Comparison of Hypervisor-based Replication vs. Current and Legacy BC/DR Technologies

hypervisor. Zerto Virtual Replication includes all of the enterprise-class features necessary to protect and replicate mission-critical applications, such as scalability, granularity, low RTO/RPO and simplified management. However, unlike legacy solutions, Zerto includes complete virtual awareness and full integration and coexistence with virtual and/or cloud environments, coupled with 'one-click' automation of failover, failback and testing. Because Zerto exclusively builds disaster recovery solutions, we can offer a superior product built specifically for replication, rather than a patch or workaround for existing infrastructure.

Please contact us to learn more about disaster-proof protection of your mission-critical applications in virtual and cloud environments.

Summary

Legacy technologies for replicating and recovering mission-critical applications are problematic. Either they were developed specifically for use with physical IT assets and are not optimized for virtual environments, or they were designed to protect data in virtualized environments, but don't have the enterprise-class features that companies need in order to protect mission-critical applications.

Only Zerto's Virtual Replication provides enterprise-class replication features that easily align with flexible virtual environments and provide the added advantage of automation and full cloud readiness.

Zerto provides enterprise-class application protection and recovery for a virtualized world. Zerto's hypervisor-based solution is divorced from the physical infrastructure. Instead, it is built specifically to work within virtual and cloud environments while maintaining all of the advanced features of physical replication solutions.



Zerto's hypervisor-based replication excels in every one of the *five* essential elements of virtual replication and recovery: simple, flexible architecture, tier-one application replication, automation, virtual awareness, and cloud readiness. Zerto Virtual Replication is also the only solution in the market that can enable Disaster Recovery-as-a-Service.



Contact us today to learn more or request a free trial at www.zerto.com or info@zerto.com.

27-43 Wormwood Street, Suite 530
Boston, MA 02210
Phone: 617.993.6331
Fax: 617.274.8795