

# DataON Optimized for Enterprise Block-Level Replication with Windows Server 2016 Storage Replica (SR)

## Welcome to Microsoft Storage Replica

Data is the lifeblood of any company, which is a key reason why Microsoft is adding significant new capabilities to Windows Server 2016 designed to ensure data availability in a flexible, secure and relatively inexpensive way.

Storage Replica (SR), a new feature in Microsoft Server 2016 Datacenter, provides block-level, synchronous data replication between servers or clusters for disaster avoidance and disaster recovery, as well as the stretching of a failover cluster across sites for high availability (see Figure 1).

You can also configure server-to-self replication using separate volumes on one computer. While not appropriate for disaster recovery, this can be a convenient way to provision a copy to a disk that can be taken out and used in another location.

## Why is Storage Replica Important?

Block-level replication has never existed in Windows before, though the technology has been around for 20 years. Block-level replication operates at a layer beneath files; it's a straight copy of each block on a disk, without having to go through a file system or application, making it extremely fast. It's similar to copying a picture, pixel by pixel. To achieve this flexible, fast replication in the past, you typically spent a great deal of money on a storage array and were forced to use the same vendor's proprietary software. Many companies have never considered the option because the cost was too high. Now you can do something that previously cost hundreds of thousands, even millions of dollars, for the cost of a few Windows Server Datacenter licenses.

## How does Storage Replica Work?

Storage Replica is essentially a disk filter driver that works at the disk layer (see Figure 2). It replicates storage blocks underneath the NTFS, ReFS, etc. IOs are the only thing Storage Replica cares about.

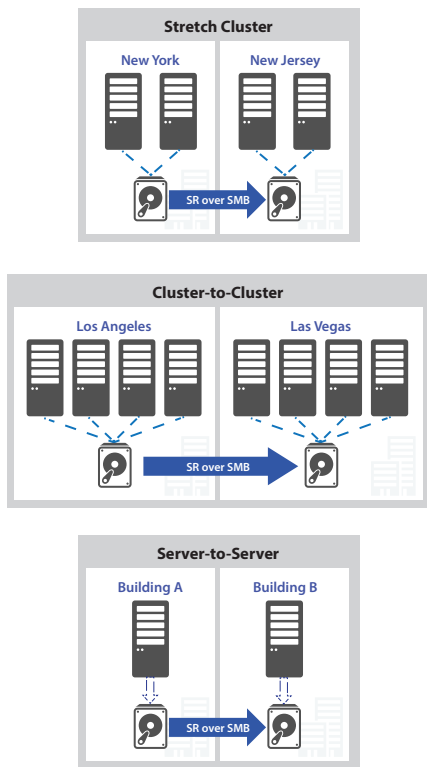
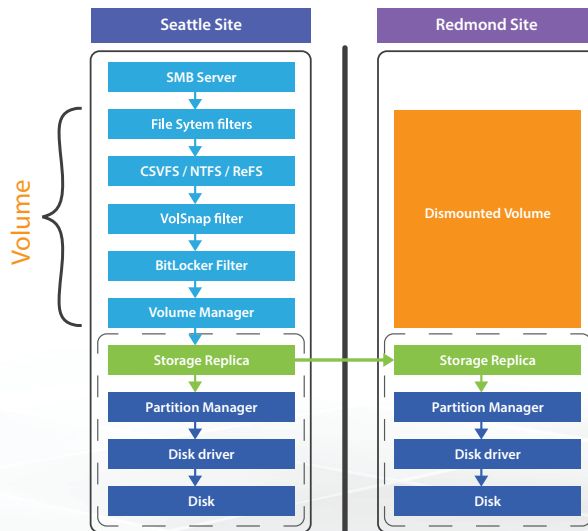


Figure 1. Stretch Cluster, Cluster-to-Cluster, and Server to Server

### Features:

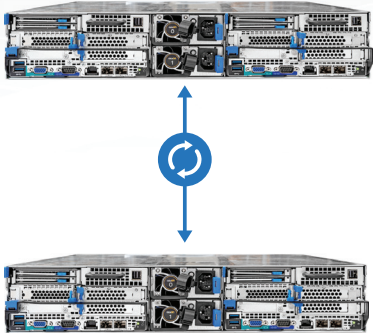
- ✓ New Feature of Window Server 2016 Datacenter Edition
- ✓ Enterprise Block-Level replication for Windows
- ✓ Automatic Failover and Synchronous Replication
- ✓ SMB3 Optimized for fast speed and lower latency



### Additional Topics from the Storage Replica White Paper:

- Synchronous versus Asynchronous Replication
- SMB Transport
- Storage Replica Requirements
- Stretch Cluster Requirements
- Networking Considerations
- Quorum Considerations
- Recommendations for Synchronous Replication
- When to use Storage Replica
- Storage Replica Best Practices
- Performance Analysis techniques

# DataON™ Cluster-in-a-Box (CiB) Recommended Solutions for Storage Replica



DataON™ Cluster-in-a-Box (CiB) appliance is an innovative all-in-one cluster platform that delivers highly-available (HA) services and shared storage in an energy saving condensed footprint. This Hyper-Converged cluster appliance is specially designed for shared storage with Microsoft's Storage Spaces, enabling customers to reduce cost, consolidate datacenter hardware, easily deploy a new platform, and quickly transition to a Microsoft Hyper-V environment.

The DataON™ CiB is built to optimize the full stack of Windows Server 2016 Scale-Out File Server (SoFS) to Software Storage Bus to Storage and Networking hardware, this appliance runs on the cluster Shared Volumes NTFS and uses high performance 12G SAS SSDs with SMB 3.0 networking to maximize performance and IOPS. This all-in-one cluster appliance is simple to deploy, scalable, reliable, flexible and provides continuous availability in a HA storage environment.

With the launch of Windows Server 2016 Storage Replica, Microsoft worked with DataON™ to deliver seamless block-level replication with DataON™ CiB. Tested by Microsoft for Storage Replica, DataON™ CiB provides users a seamless deployment in an all-in-one 2U form factor. In fact, many of the benchmarking tests were conducted with DataON™ CiB to validate real world deployment in various scenarios. The OOBE (Out of Box Experience) wizard was designed to swiftly initialize configurations, enable user accounts specify cluster and storage parameters in less than 30 minutes. Native SMB 3.0 (Server Message Block), accelerates I/O delivery, increases throughput, and provides lower latency. Effectively, DataON™ CiB allows users to deploy Storage Replica with a single appliance.

Average Recovery Traffic Throughput to Destination: 104.59 MB/s

Partition	Size	Time To Initial Sync
<b>G:</b>	7 GB	1 minute, 8 seconds

Average Recovery Traffic Throughput to Destination: 104.59 MB/s  
Source Data Set Change Rate: 14.44 MB/s

Replication Log Size	Time to Log Wrap
<b>8 GB</b>	45 minutes, 12 seconds
<b>16 GB</b>	1 hour, 30 minutes, 24 seconds
<b>32 GB</b>	3 hours, 49 seconds
<b>64 GB</b>	6 hours, 1 minute, 39 seconds
<b>128 GB</b>	12 hours, 3 minutes, 18 seconds
<b>256GB</b>	1 day, 6 minutes, 37 seconds

Write I/O Time	Percentage Completed I/O
<b>&lt; 1ms</b>	97.97
<b>1 - 2 ms</b>	0
<b>2 - 3 ms</b>	0
<b>3 - 5 ms</b>	0
<b>5 - 7 ms</b>	0
<b>7 - 10 ms</b>	0
<b>10 - 10 ms</b>	1.27
<b>100 ms - 1 second</b>	0.76
<b>&gt; 1 second</b>	0

## Synchronized time for 7GB @ 1 m and 8 sec

Microsoft's test simulated writing a series of 2MB size writes over SMB protocol from the source computer to the destination data disk. The test measured the time required for the write requests to complete at the destination data volume thereby obtaining a ballpark estimation for the time required for initial synchronization of the entire source data volume.

## Replication performance test with throughput of 3.02MB/s





Windows tested a simulated sequence of remote write requests over SMB to the destination log disk. The rate of remote write requests were coordinated to be the exact number of data bytes as measured at the source data volume.

## 97.7% of writes completed in less than 1ms

The table below shows the distribution of average write latencies as measured from the source computer for all simulated writes to source log and destination log.

## About DataON™

DataON™ is the industry leading provider Hyper-Converged Cluster Appliances (HCCA) and storage systems optimized for Microsoft® Windows Server environments. Our solutions are built with the single purpose of rapidly and seamlessly deploying Microsoft applications, virtualization, data protection and hybrid cloud services. Our company is focused on customers who have made the "Microsoft Choice" and we provide the ultimate platform for the Microsoft Software-Defined Data Center (SDDC). DataON™ is a division of Area Electronics.

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