

# MS EXCHANGE SERVER ACCELERATION IN VMWARE ENVIRONMENTS WITH SANRAD VXL



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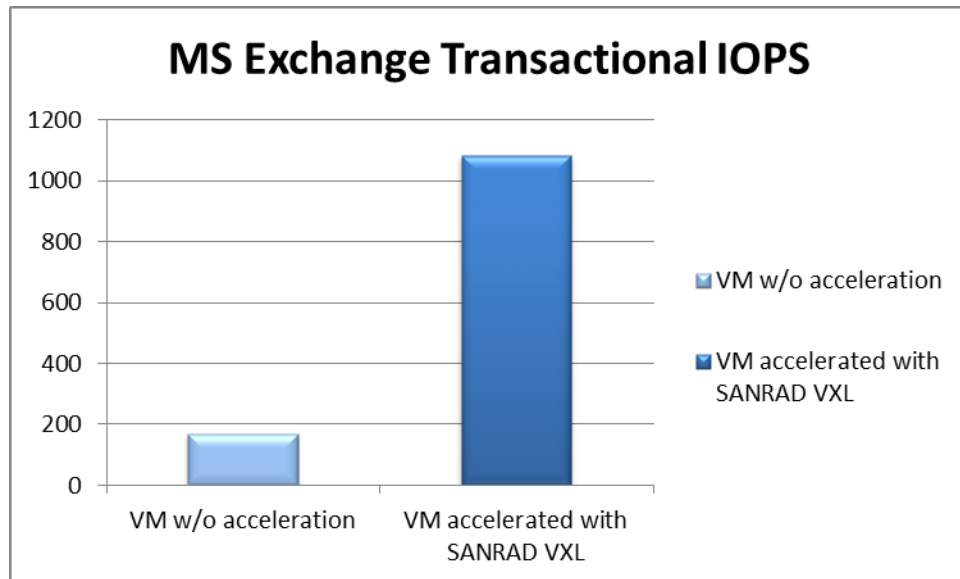
## EXECUTIVE SUMMARY

SANRAD VXL provides enterprise class acceleration for virtualized environments. The VXL provides a rich enterprise feature set, is designed to run in and take advantage of enterprise virtualization environments, and provides the high availability and resilience required in such environments.

In this document we present the accelerated performance achievable with the SANRAD VXL for virtualized Microsoft Exchange Servers. Using the Microsoft Jetstress load generator we compare the results attained with a virtual machine running an exchange server data base before and after the addition of SANRAD's VXL to the host for acceleration.

Essential to the end user experience of Exchange server are the storage latency and transactional IOPS of the mail servers. These two parameters directly impact the usability of mail system as well as the number of mailboxes that can be hosted by a virtual server environment.

We show that deploying the VXL on a VMware ESX host with host based Flash provides a dramatic increase in Exchange Transactional IOPS for MS Exchange running as a VM in the environment. As seen below transaction IOPS for the test cases increased **more than 6x** (from 170 IOPS to 1083 IOPS). This increase in IOPS was accompanied by a large decrease in the DB read latency (from 20.3ms to 6.7ms) thus reaching access times 3 times faster than the Microsoft usability requirements.



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## INTRODUCTION

SANRAD's VXL software delivers SANRAD's Flash caching and virtualization technology into server virtualization platforms.

Key capabilities of the VXL include:

- Efficient dynamic distribution of host-based FLASH resources to guest virtual machines via its application optimized cache engine
- Supports key enterprise-class storage data center requirements like high availability, storage virtualization, and resilience
- Runs on VMware vSphere, Microsoft Hyper-V, and Xen-based hypervisors
- Guarantees cache migration for vMotion – Cached data is treated as a virtualized storage entity and can be migrated between ESX servers along with the virtual volumes without performance loss
- Allows for caching over highly available mirrored volumes, ensuring that a single FLASH resource is used to accelerate both copies of the data, doubling the efficiency of FLASH utilization
- No agent required on the application virtual machine
- Central management is provided, so that IT does not need to manage each accelerated virtual machine separately
- In contrast to other virtual machine acceleration architectures, with the VXL no CPU or memory resources are taken from the application virtual machine. Thus the application's own internal memory and IO optimization strategies continue to be effective **on top of** the storage acceleration. All caching is performed in a central appliance so that host resource allocations can be monitored and controlled.

Microsoft Exchange Server is one of the most widely used e-mail servers in enterprise environments. Outlook clients connect to a central server which accesses an ESE DB and a log to manage the collection, distribution, and retention of e-mails and associated metadata.

Key to Exchange Server performance are the transactional access rates and DB read latencies. These parameters have been designated by Microsoft as determining the number of users that can be supported in a given environment along with the user experience that each mailbox user will perceive.

## METHODOLOGY

This whitepaper presents the effect of adding Host based Flash and SANRAD VXL software acceleration to your virtualized Microsoft Exchange Server environment.

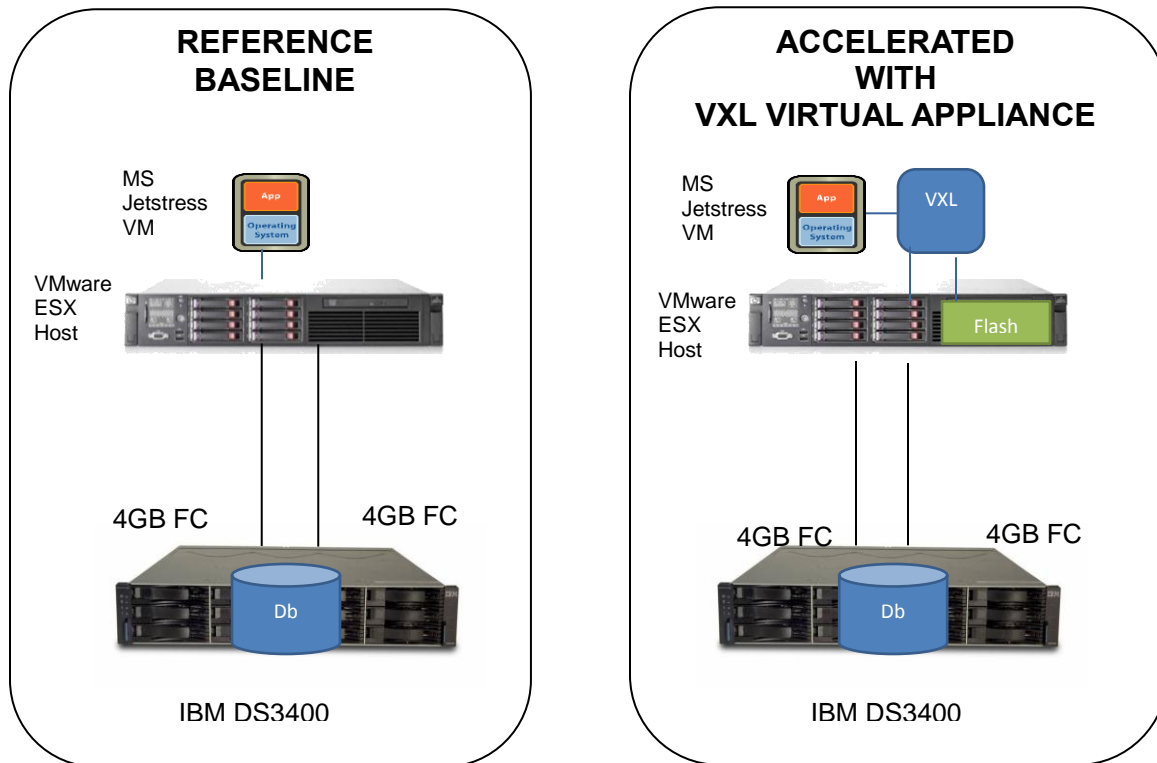
We compare the performance of two environments (see Figures below):

- A. **A baseline reference environment** with a virtual machine containing MS Jetstress (Microsoft Exchange Server Traffic Generator) deployed on an IBM server host connected to an IBM DS3400 system with SATA disks arranged as a RAID 5 LUN.
- B. **A Flash accelerated environment** with the V-Switch XL virtual acceleration appliance added on the host server. Under this configuration the VXL accelerates the external SATA disks using local Flash resources on the host server. The accelerated volume is presented as an internal iSCSI volume to the MS Jetsress virtual machine.

The VXL virtual appliance dramatically increases the IOPS and reduces the latency of the underlying storage using the host internal flash resources and its advanced caching algorithm.

To simulate the sustained storage loads in production Exchange environments we ran a standardized 2 Hr Jetstress test of 200 mailboxes each with 2 GB mailbox sizes.

We compare the Total Transactional IOPS and the DB latency metrics before and after acceleration.



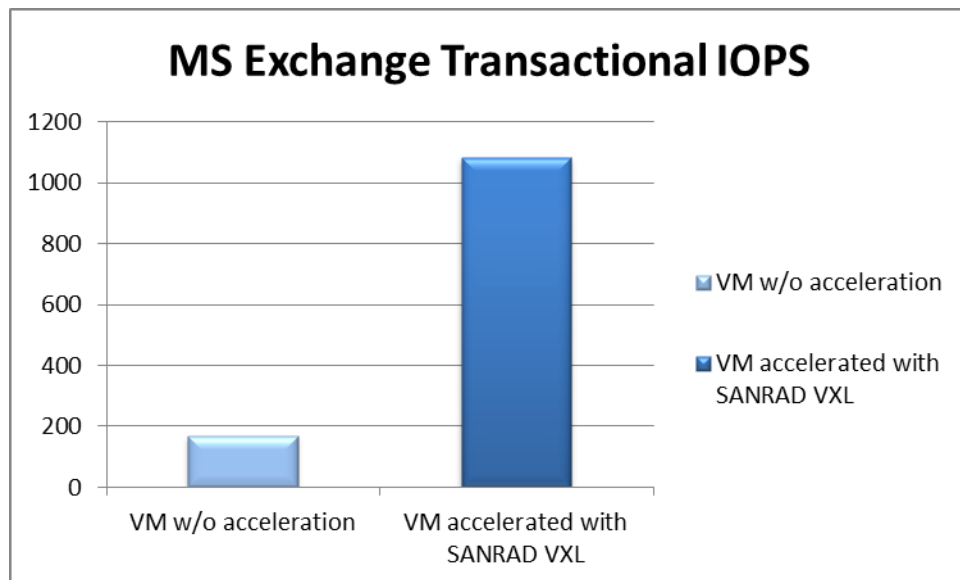
## RESULTS

Table I accompanied by the following figures below summarize the transaction IOPS and DB read latency before and after acceleration with the VXL and host based Flash.

*Table I – MS Exchange Transactional IOPS and DB Read Latency with and w/o Acceleration*

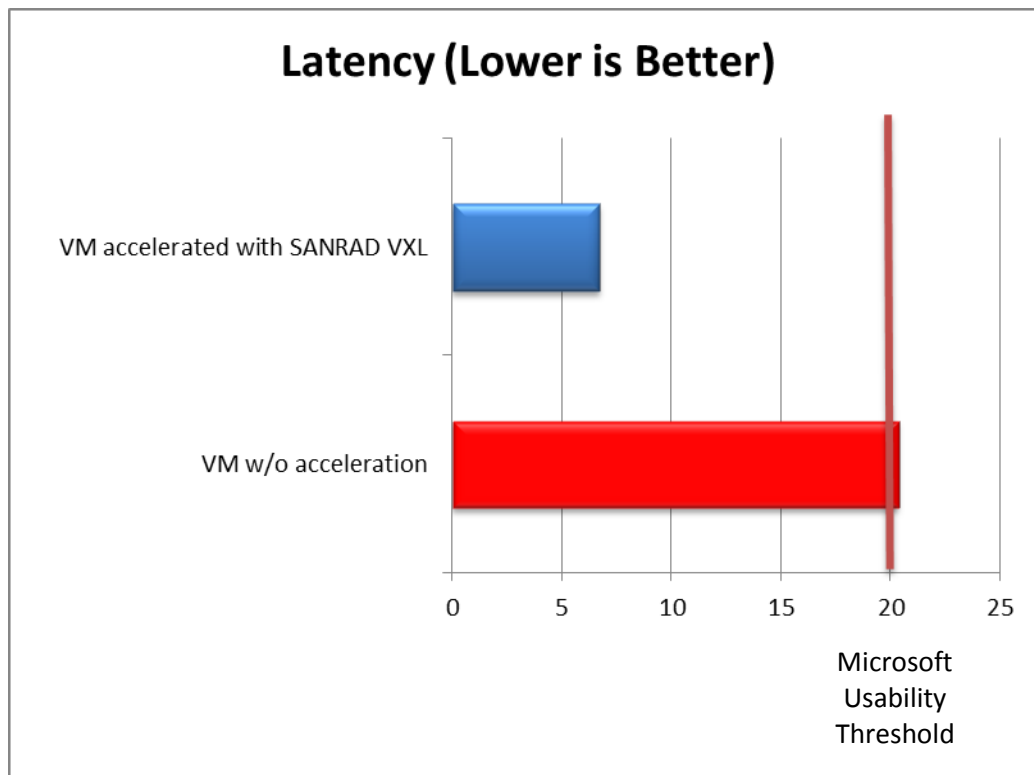
	VM accelerated with SANRAD VXL	VM w/o acceleration	Acceleration Factor
<b>Transactional IOPS</b>	<b>1083.006</b>	170.023	<b>x 6.3</b>
<b>Latency</b>	<b>6.698</b>	20.345	
<b>Microsoft User Experience Requirements</b>	<b>Pass</b>	Fail	

As seen in the graph below the introduction of the VXL and host based acceleration lead to a **6.3x** increase in transactional IOPS supported. This immediately translates into the ability to support many more users on the VM environment as well the capability to support heavier usage loads and usage peaks without affecting the users' usability experience.



Latency after acceleration has been reduced to a third of its previous value (see figure below). Note that before the addition of the VXL and Flash acceleration, the Exchange VM did not pass the Microsoft recommended threshold for performance (i.e latencies of less than 20ms). However after introduction of the VXL the accelerated latency was far below the 20ms latency,

indicating that VM now easily pass the usability requirement and can support additional users on the same environment.



## HOW IT WORKS

SANRAD's software is deployed as a virtual appliance on the host server, distributing the FLASH resources on demand across application virtual machines to maximize the performance of key applications.

The caching algorithm includes application optimized caching strategies to decide what data to cache on the FLASH. The algorithm is transparent to the virtual machines, which are exposed to a seamlessly accelerated virtual volume.

The Flash cache is shared dynamically between all VMs, and the caching software ensures that the Flash cache is optimally utilized at all times, regardless of how many VMs are running concurrently.

In the VXL solution no guest virtual machine agents are required. The VXL iSCSI connectivity enables support of most modern operating systems including all variants of Windows and Linux servers. This is in contrast to other caching solutions which require an installation of an agent or driver on each VM.

By combining storage acceleration and storage virtualization capabilities, The VXL supports vMotion **without loss of cache**. When a virtual machine is migrated to a new



<b>Supported Virtualization Platforms</b>	VMware ESX Microsoft Hyper-V Xen-based Virtualization
<b>Supported Virtual Machines Operating Systems</b>	Windows all variants Linux all variants Others (any with iSCSI initiators)
<b>vMotion Support</b>	Ability to migrate virtual server <i>without</i> loss of cache data
<b>Agentless Connectivity</b>	No installation required on guest virtual machines; virtual machines connect via virtual internal iSCSI links.
<b>SLA protection for High - priority Applications</b>	User can define bandwidth access priority and protection for selected virtual machines
<b>Live Data Migration</b>	Supports live data migration without affecting caching
<b>High Availability and Data mirroring</b>	Efficient combination of caching algorithm with mirroring and high availability of storage
<b>Data Replication (disaster recovery)</b>	Integrated, enables use of FLASH resources for replication without affecting performance

## CONCLUSIONS

The SANRAD VXL virtual appliance provides an enterprise class solution to Flash resource management and acceleration in the data center. In this document we present the effect of adding host based Flash resources accelerated using SANRAD VXL software in VMware environments.

Using the VXL caching algorithms the performance of Exchange VM's increases more than a six-fold.

The increased performance translates into a higher ROI for the enterprise as the same virtual infrastructure can now support a much larger number of users, as well as an increase in Employee productivity with peak e-mail usages no longer affecting the end user performance.

## APPENDIX

### Test Configuration

