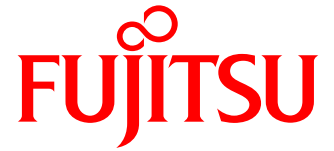


White Paper

The FUJITSU Storage ETERNUS AF series and ETERNUS DX series Plug-In for Veeam Backup & Replication Eases High-Speed Backups of Virtual Environments



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The combination of Veeam Backup & Replication and FUJITSU Plug-In for Veeam Backup & Replication is optimal for backups of virtual environments.

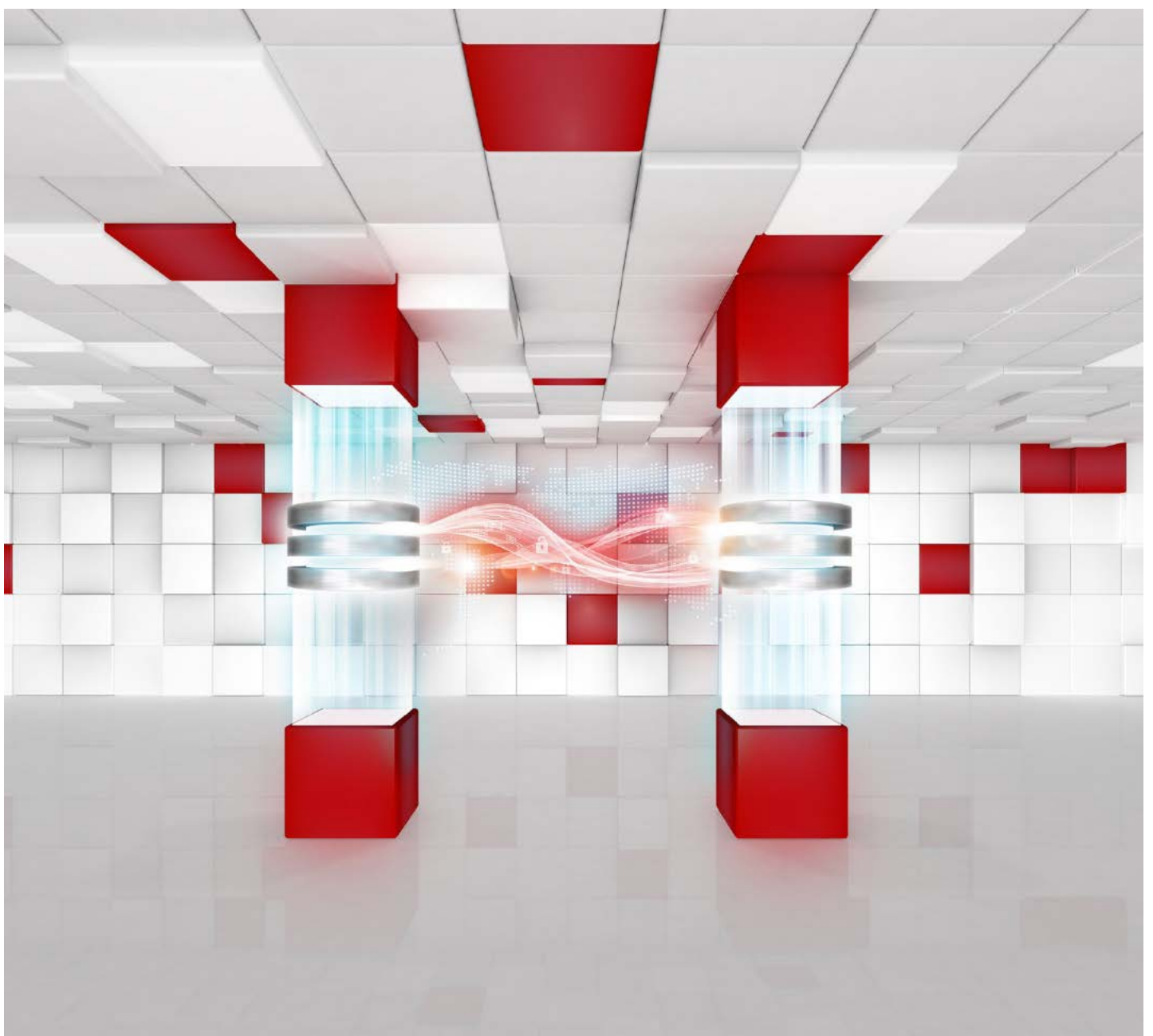


Table of Contents

Preface3

1. ETERNUS AF/DX4

2. Veeam Backup & Replication4

3. FUJITSU Plug-In for VBR5

 3.1. Virtual Machine Backups with FUJITSU Plug-In for VBR5

4. Verification of FUJITSU Plug-In for VBR6

 4.1. Overview6

 4.2. Settings7

 4.2.1. Registering the ETERNUS AF/DX7

 4.2.2. Configuring Backup Jobs with Storage Snapshots8

 4.3. Results9

 4.3.1. VM Snapshot Lifetime9

 4.3.2. Offloaded CPU Load from the Production Server9

 4.3.3. Throughput to the Production Server Datastore10

 4.4. Summary11

5. Conclusion12

List of Figures

Figure 3-1 FUJITSU Plug-In for VBR 5

Figure 3-2 Process of a Data Backup Using a Storage Snapshot 5

Figure 4-1 FUJITSU Plug-In for VBR Verification Configuration 6

Figure 4-2 Comparison of CPU Loads on the Production Server 9

Figure 4-3 Comparison of the Throughput to the Production Server Datastore 10

Figure 4-4 Improvement in Backups When FUJITSU Plug-In for VBR Is Activated 11

List of Tables

Table 4-1 Device List 6

Table 4-2 Software List 6

Table 4-3 Resulting Backup Runtimes and VM Snapshot Lifetimes 9

Preface

As production servers are being consolidated with virtual environments at a rapid rate, data protection via backups is as important as ever. Problems such as lengthy backups due to server consolidation and reduced performance of virtual environments are not easy to solve. FUJITSU Plug-In for Veeam Backup & Replication has been released to take advantage of Veeam Backup & Replication's outstanding backup capabilities.

This document explains the advantages of adopting FUJITSU Plug-In for Veeam Backup & Replication and provides a verification of its effectiveness to create backups of virtual environments.

The product lineup and product information stated in this document are current as of November 2019.

■ Target Audience

This document targets the following audience:

- Those considering the adoption of Veeam Backup & Replication
- Those who want to confirm the effectiveness of Veeam Storage Integration
- Those who want to resolve problems with backups of virtual environments

■ Applicable Series

This document covers the following series:

- FUJITSU Storage ETERNUS AF150 S3, AF250 S3/S2, and AF650 S3/S2
- FUJITSU Storage ETERNUS DX60 S5/S4, DX100 S5/S4, DX200 S5/S4, DX500 S5/S4, and DX600 S5/S4

■ Naming Conventions

The following abbreviations are used in this document.

- FUJITSU Storage ETERNUS AF S3/S2 series All-Flash Arrays ETERNUS AF series
- FUJITSU Storage ETERNUS DX S5/S4 series Hybrid Storage Systems ETERNUS DX series
- FUJITSU Storage ETERNUS AF S2 series and ETERNUS DX S4 series (excluding ETERNUS DX8900 S4) ETERNUS AF S2/DX S4
- ETERNUS AF series and ETERNUS DX series (excluding ETERNUS DX900 S5 and ETERNUS DX8900 S4) ETERNUS AF/DX
- FUJITSU Plug-In for Veeam Backup & Replication FUJITSU Plug-In for VBR

White Paper

The FUJITSU Storage ETERNUS AF series and ETERNUS DX series Plug-In for Veeam Backup & Replication Eases High-Speed Backups of Virtual Environments

1. ETERNUS AF/DX

The ETERNUS AF series is a high performance, high reliability storage system developed by Fujitsu. This series uses SSD data storage, eliminating the processing of conventional HDD data storage to increase speed, reduce power consumption, and save space.

Furthermore, by implementing Fujitsu's one-of-a-kind technology, the lifespan and performance of high-speed SSDs have been maximized. By using high performance CPU and multiprocessing technology, the performance of the storage system has been greatly improved, which firmly accelerates databases, virtual environment consolidations, and data analysis.



ETERNUS AF series

The ETERNUS DX series utilizes a hybrid storage configuration, which combines ultrahigh-speed SSDs, high-speed online SAS disks, and large-volume, low-cost Nearline SAS disks. These can be used flexibly to optimize the resources of the system based on the customers' needs.

2. Veeam Backup & Replication

Designed primarily for VMware vSphere and Microsoft Hyper-V^{*1} virtual environments, Veeam Backup & Replication integrates virtual machine backups and replications in a single solution and offers a large array of optional features that support leading applications without the need to install agents.

For virtual machine backups, in addition to a full backup, a forward incremental backup, forever forward incremental backup, or reverse incremental backup can be selected based on the environment. This software also has a high affinity with storage systems and includes a function to create backups by integrating the storage system's snapshot function.

With the Instant VM Recovery function to recover virtual machines for VMware environments, backup files can be accessed directly and used to quickly restore virtual machines to the production environment. Instant VM Recovery can reduce the targeted time for recovery, also known as Recovery Time Objective (RTO)^{*2}, and minimize the amount of time that the production environment VMs are suspended or down.

^{*1} Virtual environment supported by Fujitsu.

^{*2} The targeted amount of time until the system can be recovered from an abnormality.

3. FUJITSU Plug-In for VBR

The ETERNUS AF/DX supports Veeam Storage Integration.

Installation of FUJITSU Plug-In for VBR on the Veeam Backup Server enables Veeam Storage Integration to create backups of virtual machines efficiently at high speed.

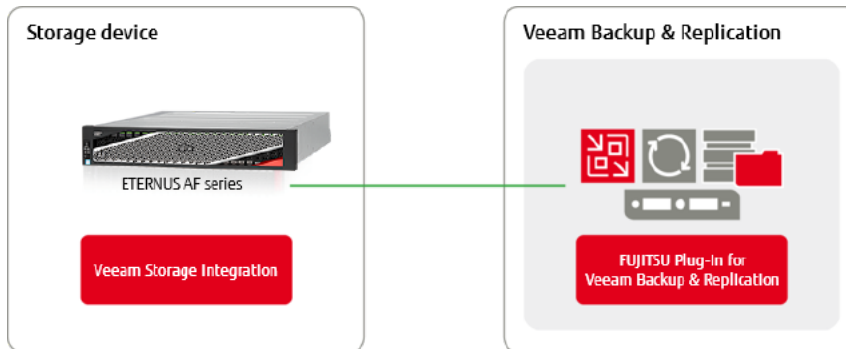


Figure 3-1 FUJITSU Plug-In for VBR

3.1. Virtual Machine Backups with FUJITSU Plug-In for VBR

FUJITSU Plug-In for VBR is a plug-in that integrates Veeam Backup & Replication and uses storage snapshots to create backups of individual virtual machines.

By taking the lifetime of the VM snapshot created by VMware Storage API^{*1} into consideration, conventional backup operations are performed when the load on the production server is low. By leveraging storage snapshots, the VM snapshot life time is reduced. This minimizes the impact on the performance of the production server. As a result, designing backup operations can be simplified.

As storage snapshots offload the CPU and I/O loads of the ESXi host that is performing the backup to the storage system, the time required for the backup is reduced without affecting the performance of the virtual machine targeted for the backup. Therefore, multiple backups can be performed efficiently during the same period.

*1 Formally known as VMware vStorage APIs for Data Protection (VADP)

The following figure shows the process of a data backup using a storage snapshot.

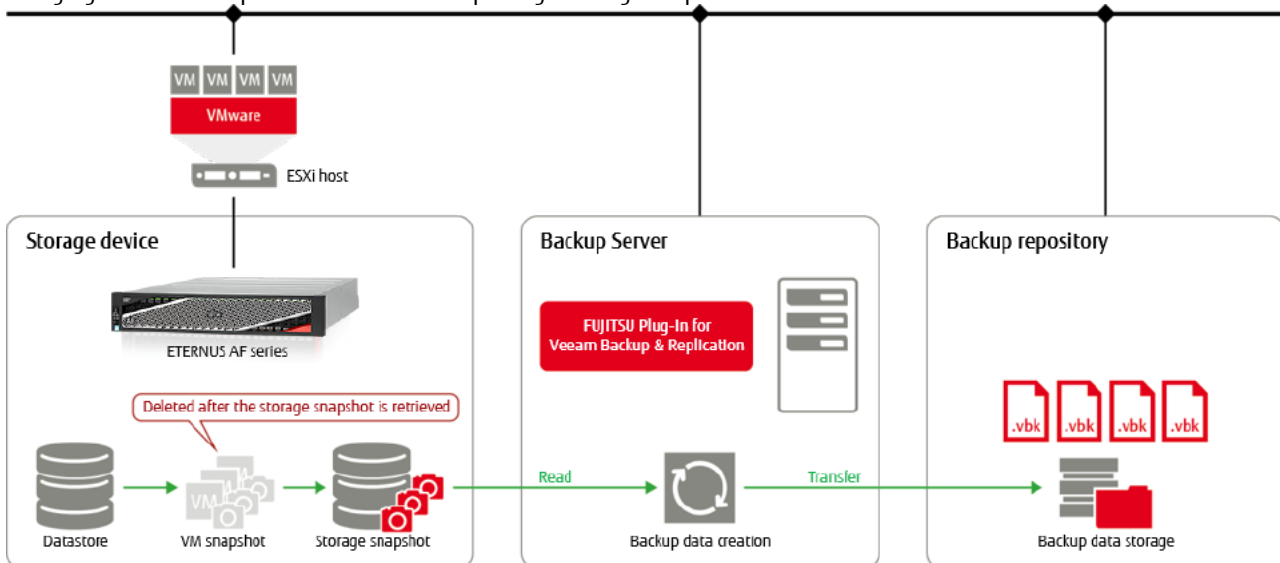


Figure 3-2 Process of a Data Backup Using a Storage Snapshot

The storage snapshot is saved and is read in a separate area of the storage system from the datastore and VM snapshot.

The VM snapshot is automatically deleted after the storage snapshot is completed. Then, the storage snapshot is automatically deleted after the backup is completed.

The backup proxy reads the storage snapshot to create the backup data and then the backup data is transferred to the backup repository to be saved.

For the storage snapshot, the target is the virtual machine in the datastore allocated from the Thin Provisioning Pool.

Because storage snapshots are saved to an unused area in the Thin Provisioning Pool, a separate storage destination is not necessary.

Even for systems already implementing backup operations with Veeam Backup & Replication, FUJITSU Plug-In for VBR can be easily installed without needing to redesign for storage snapshots.

Veeam Backup & Replication 9.5 (Update 4a or later) is required for FUJITSU Plug-In for VBR. In addition, the firmware version of the ETERNUS AF S2/DX S4 must be V10L86 or later.

4. Verification of FUJITSU Plug-In for VBR

4.1. Overview

This section verifies the effectiveness of FUJITSU Plug-In for VBR.

- Reduced VM snapshot lifetime
- Validation of offloaded backup load (CPU load and throughput to the datastore) from the production server

Assumption: Production server based user applications update data at a rate of 5GB per minute in the datastore during the backup runtime.

Measurements of both the time needed to store VM snapshots and the backup load on the production server running user applications confirm the effectiveness of the FUJITSU Plug-In for backup operations of VBR.

The verification configuration is as follows.

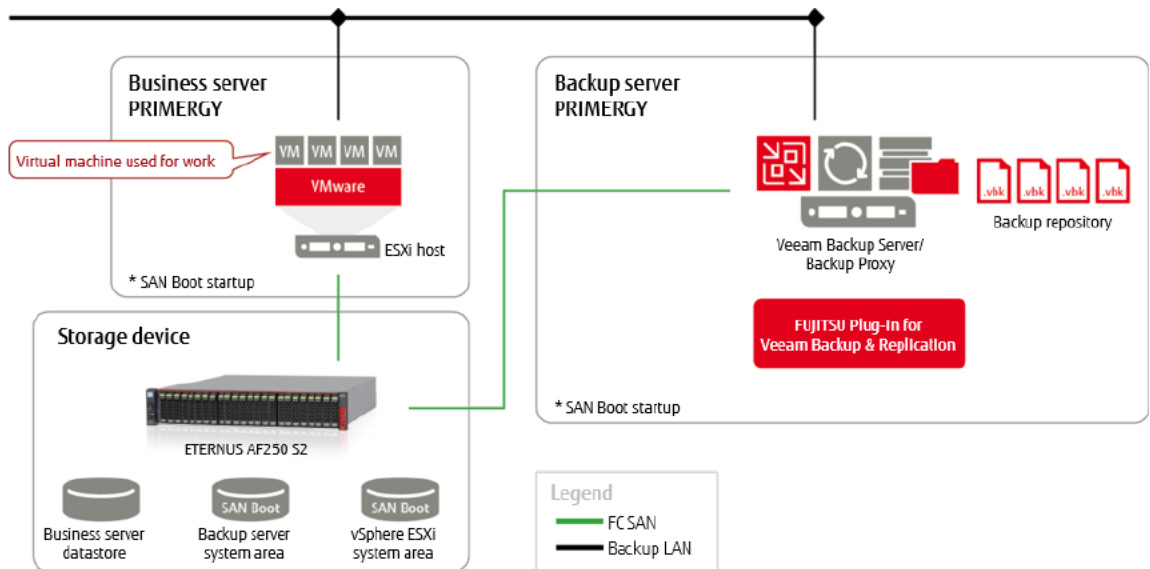


Figure 4-1 FUJITSU Plug-In for VBR Verification Configuration

The devices and software used in the above configuration are as follows.

Table 4-1 Device List

Name	Model	Remark
Production server	PRIMERGY	Resources allocated to each VM Production server (per server): 1 vCPU, 4 GB of memory
Backup server	PRIMERGY	
Storage device	ETERNUS AF250 S2	Thin Provisioning Pools are configured with flash

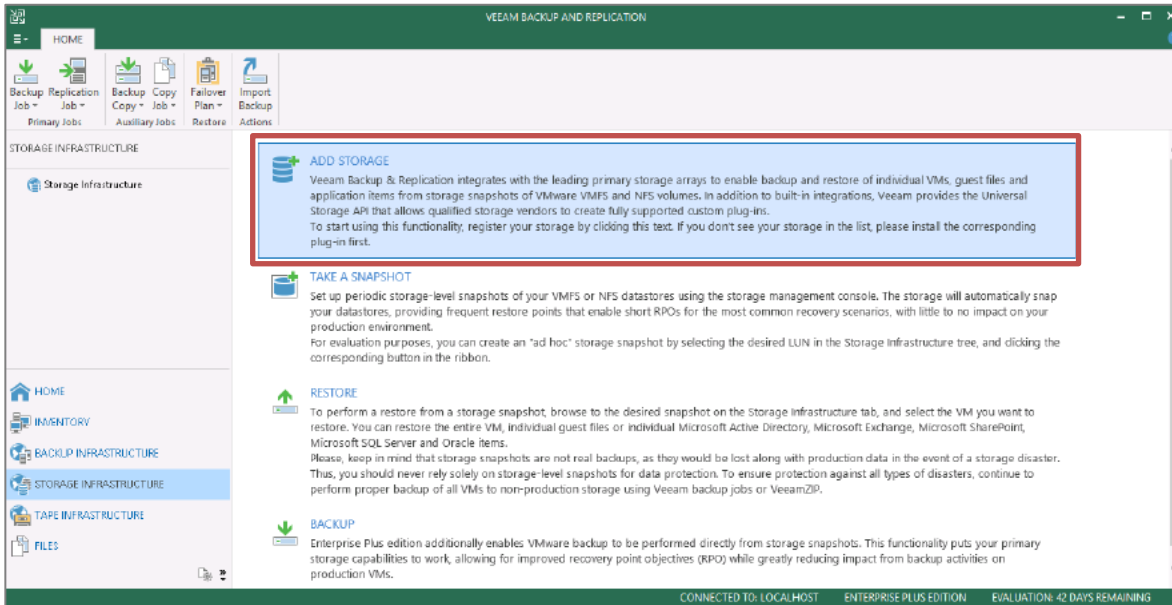
Table 4-2 Software List

Name	Product, Version	Remark
Hypervisor	VMware vSphere 6.7	vSphere ESXi
Guest OS	Windows Server 2016 Datacenter	
Backup server OS	Windows Server 2016 Datacenter	Physical server
Data protection	Veeam Backup & Replication 9.5 Update 4a	
Plug-in	FUJITSU Plug-In for Veeam Backup & Replication 1.0	

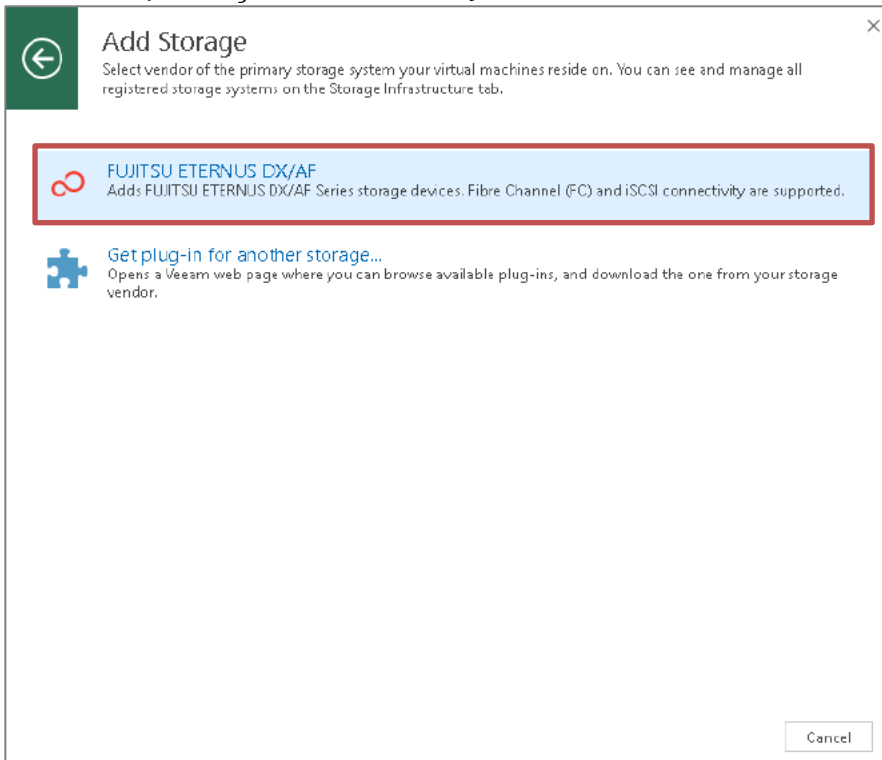
4.2. Settings

4.2.1. Registering the ETERNUS AF/DX

Register a storage system using the **STORAGE INFRASTRUCTURE** wizard of the Veeam Backup & Replication console. For details about storage registration, refer to the manual for Veeam Backup & Replication.

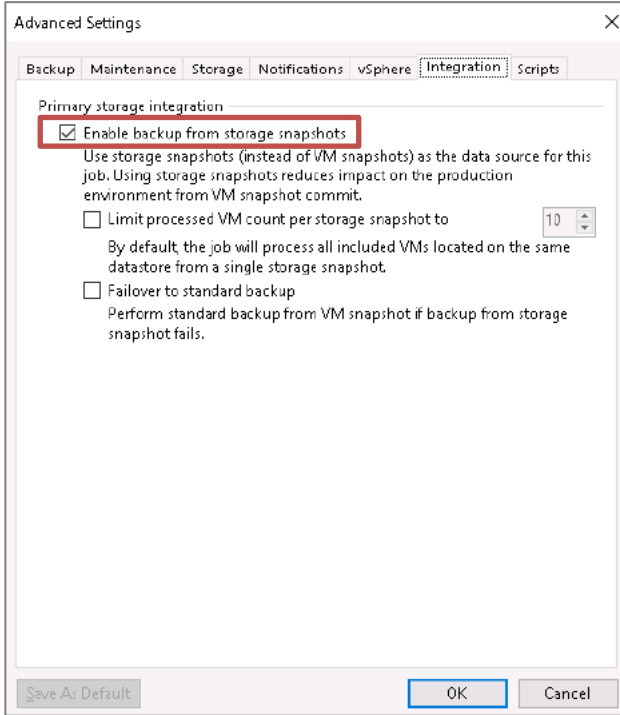


Installation of FUJITSU Plug-In for VBR enables **FUJITSU ETERNUS DX/AF** to be selected when adding a storage system.

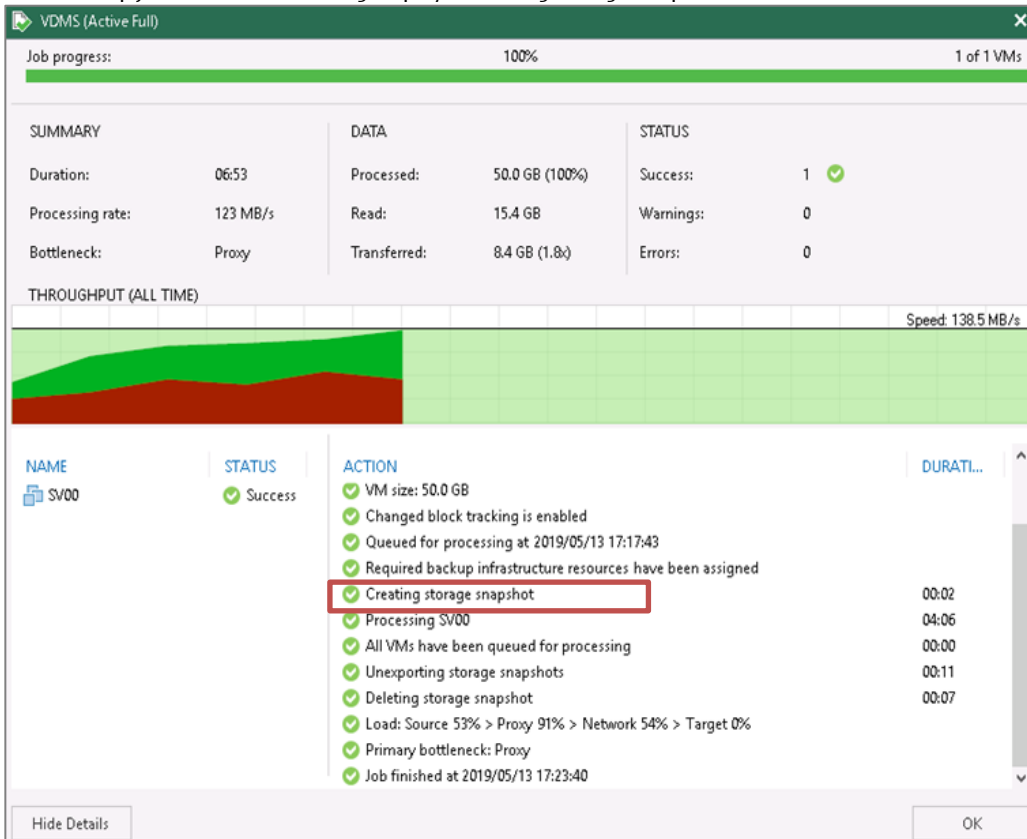


4.2.2. Configuring Backup Jobs with Storage Snapshots

In the backup job settings, select **Enable backup from storage snapshots** on the **Integration** tab of **Advanced Settings**. For details about the settings, refer to the manual for Veeam Backup & Replication.



When a backup job is executed, the log displays "Creating storage snapshot" which confirms that the storage snapshots are enabled.



4.3. Results

4.3.1. VM Snapshot Lifetime

Table 4-3 Resulting Backup Runtimes and VM Snapshot Lifetimes

Condition	Result	
	Backup runtime	VM snapshot lifetime
Not activated / Disabled	5min 00sec	3min 05sec
Activated / Enabled	3min 39sec	11sec
Resulting improvement	1min 21sec	2min 54sec

When storage snapshots are enabled, the backup time is reduced by 1 minute and 21 seconds (about 27%) and similarly, the VM snapshot lifetime is reduced by 2 minutes and 54 seconds (about 94%) when storage snapshots are enabled.

4.3.2. Offloaded CPU Load from the Production Server

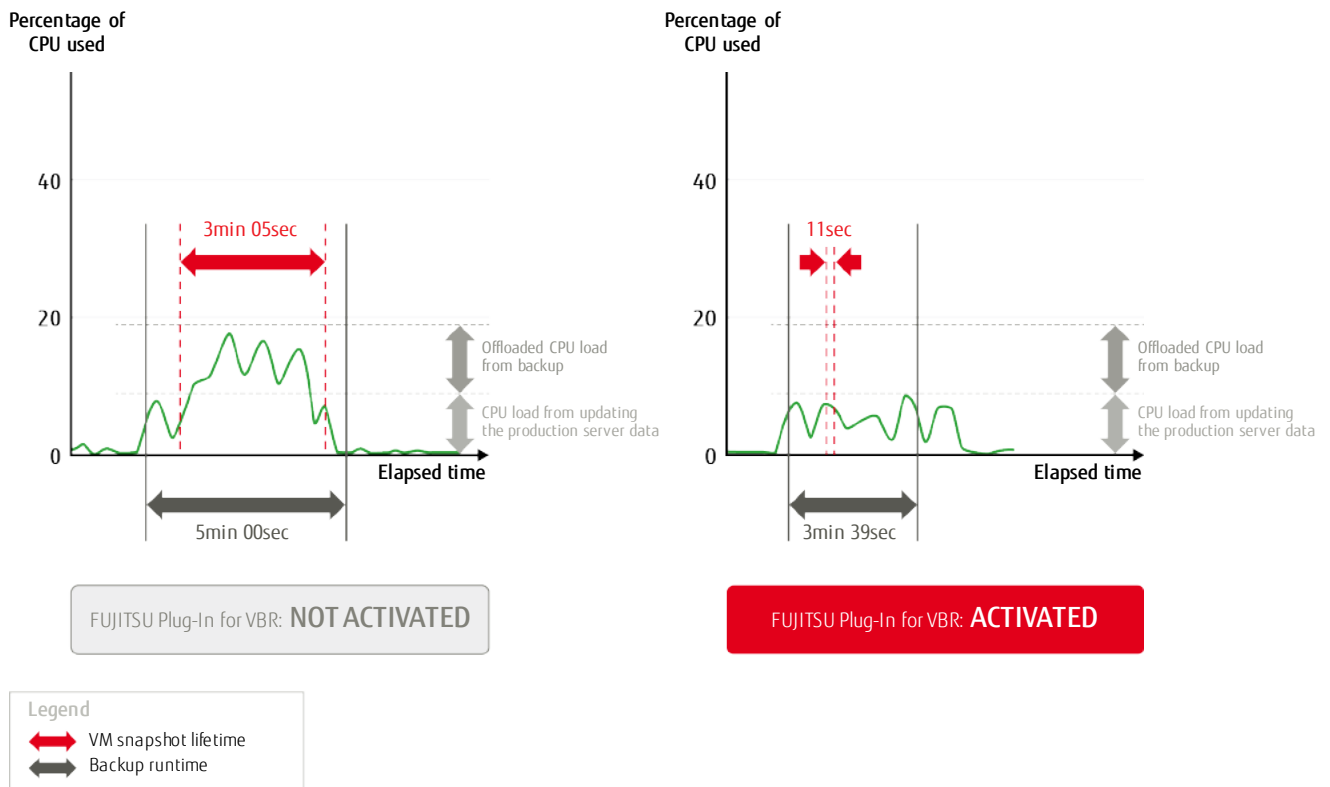


Figure 4-2 Comparison of CPU Loads on the Production Server

The verification is performed when the CPU load from the user application is 10%.

When FUJITSU Plug-In for VBR is not activated, the CPU load during the backup process is as high as 20%, meaning that the load from the backup itself is 10%.

When FUJITSU Plug-In for VBR is activated, the CPU load remains at less than 10%, meaning that there is no load from the backup because the load is almost the same as that of the user application.

4.3.3. Throughput to the Production Server Datastore

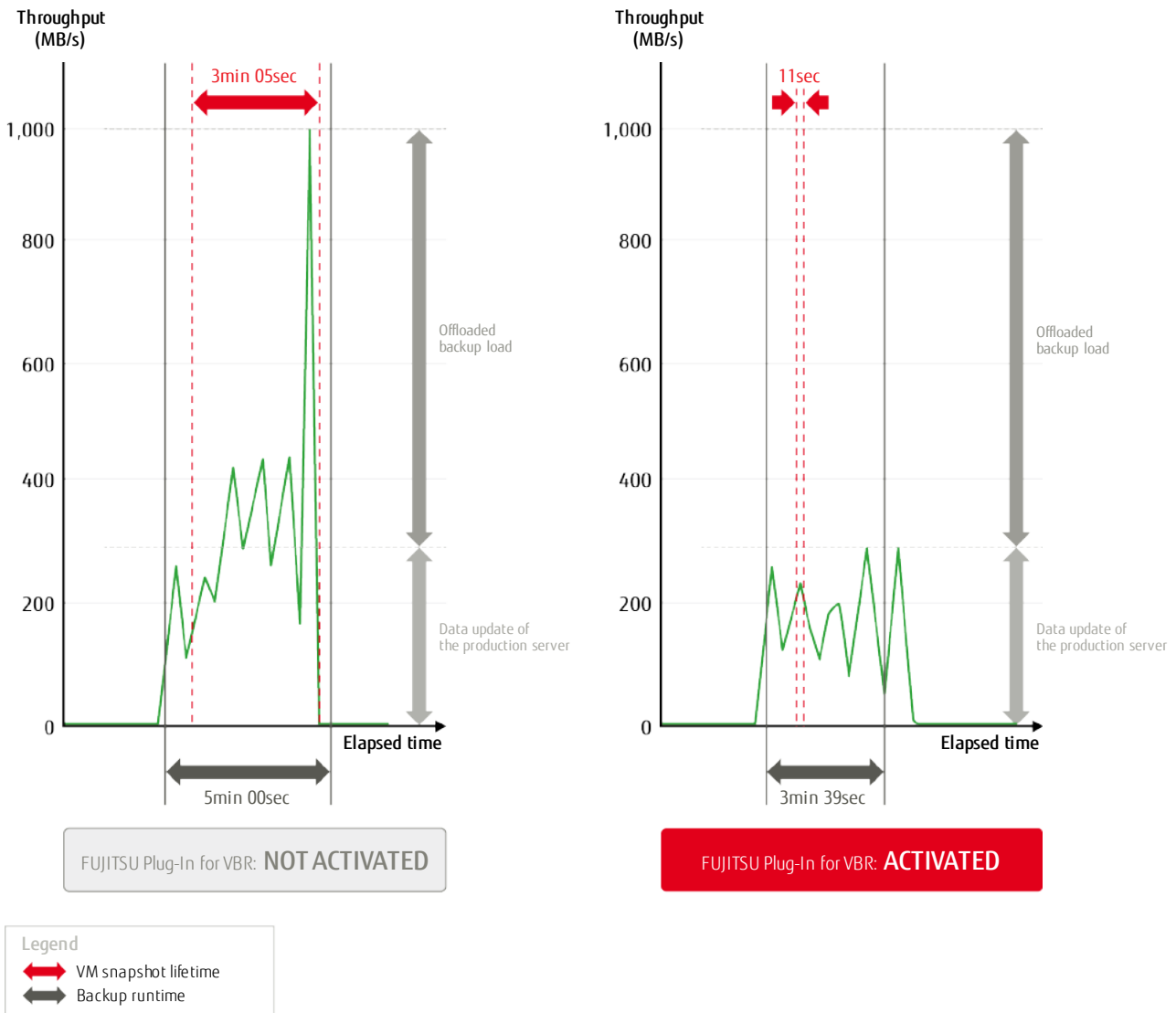


Figure 4-3 Comparison of the Throughput to the Production Server Datastore

When the FUJITSU Plug-In for VBR is not activated, the throughput rate to the datastore commutes around 200MB/s while the VM snapshot is stored and shows a remarkable spike to 1000MB/s at the end of the process. This heavy increase occurs because the VM snapshot must be committed. Thus the backup process generates a large amount of additional throughput.

If the FUJITSU Plug-In for VBR is in use, the throughput rate during the backup runtime is mainly caused by the user application. The amount of throughput resulting from the backup process itself is negligible.

4.4. Summary

The results of the FUJITSU Plug-In for VBR verification are as follows.

- Backup time is reduced by about 27%
- VM snapshot lifetime is reduced by about 94%
- CPU load and throughput to the datastore from backing up the production server are offloaded to the storage system

The following graph shows the performance impact on the production server.

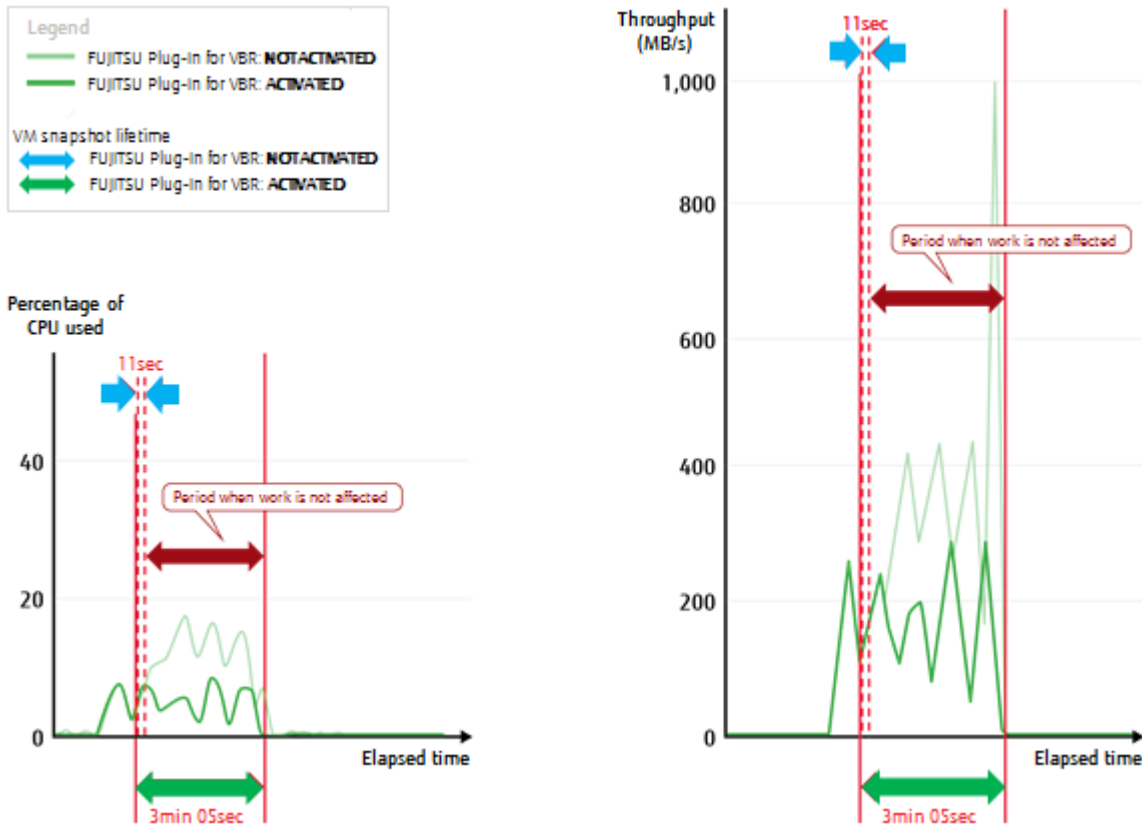


Figure 4-4 Improvement in Backups When FUJITSU Plug-In for VBR Is Activated

When FUJITSU Plug-In for VBR is activated, both the CPU load and the datastore throughput are reduced when a backup is performed during the VM snapshot lifetime.

By reducing the lifetime dramatically and offloading the load during the backup, FUJITSU Plug-In for VBR allows backups to be performed any time during business hours.

White Paper

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5. Conclusion

By using FUJITSU Plug-In for Veeam Backup & Replication, backups can be created without affecting the production server. Backup operations can be performed easily, without worrying about how the backup time affects the production server.

The FUJITSU Storage ETERNUS AF S3/S2 series, ETERNUS DX S5/S4 series and FUJITSU Plug-In for Veeam Backup & Replication are the solution to the problems associated with the long period of keeping VM snapshots when creating virtual environment backups.

The combination of Veeam Backup & Replication and FUJITSU Plug-In for Veeam Backup & Replication with the FUJITSU Storage ETERNUS AF S3/S2 series, ETERNUS DX S5/S4 series provides an optimal backup solution for virtual environments.

Related Websites

- Veeam Software website
<https://www.veeam.com/>
- Download FUJITSU Plug-In for Veeam Backup & Replication from the Veeam Software website
<https://www.veeam.com/backup-replication-download.html>
- Download a trial version of Veeam Backup & Replication
<https://www.veeam.com/vm-backup-recovery-replication-software.html>
- FUJITSU Storage ETERNUS DX S5/S4 series, FUJITSU Storage ETERNUS AF S3/S2 series
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