

Veeam Backup & Replication

What's New in 9.5?

Veeam® Backup & Replication™ 9.5, part of Veeam Availability Suite™, builds on the enterprise enhancements introduced in v9 by adding a number of new cutting-edge capabilities delivering *Availability for the Always-On Enterprise™*. It helps organizations meet today's service-level objectives enabling recovery of any IT service and related applications and data within seconds and minutes. The following is a list of the new, major features and functionalities added in 9.5.

Enterprise scalability enhancements

The exponential growth of data and provisioned IT services is forcing businesses and enterprises of all sizes to rethink their Availability strategy. Through a host of new enterprise enhancements, Veeam scales efficiently and effectively, regardless of environment size and number of VMs.

Backup acceleration technologies double I/O performance and shorten backup windows by up to five times — all while reducing load on primary storage, backup storage and vCenter Servers. Features include:

- **Advanced data fetcher** improves backup performance for individual virtual disks up to two times on enterprise-class primary storage while significantly reducing the load on primary storage due to the reduced number of I/O operations required to complete a backup, improving its availability to production workloads. Advanced data fetcher is available for the VMware platform and the following processing modes: Backup from Storage Snapshots, Virtual Appliance (hot add) and Direct NFS.
- **VMware vSphere infrastructure cache.** Maintains an in-RAM mirror of vSphere infrastructure hierarchy to dramatically accelerate job start up (Building VM list operation) and user interface responsiveness while browsing a virtual infrastructure. This approach removes the load from a vCenter Server, making it more available to perform its core infrastructure management duties, and improves backup success ratio in the environments where jobs would often time out or fail due to an overloaded vCenter Server. The cache is maintained up-to-date with real-time updates via a subscription to vCenter Server infrastructure change events.
- **Highly optimized vSphere infrastructure queries.** Help ensure vSphere API queries complete faster and minimize vCenter Server load when full vSphere infrastructure hierarchy retrieval is required. For example, this is helpful after a backup server is rebooted or Veeam Broker Service (the service hosting the vSphere infrastructure cache) is restarted.

Restore acceleration technologies, including custom-tailored logic for raw disk, deduplicating storage and tape, greatly improve VM restore performance regardless of the restore scenario, including:

- **Instant VM Recovery®** has improved performance up to three times depending on the scenario, with a majority of the improvement observed when recovering multiple VMs at once from per-VM backup file chains.
- **Parallel processing for full VM restore** restores multiple disks in parallel, similar to the way backup is performed. This technique is automatically used for all disk-based backup repositories except Data Domain deduplicating storage

Veeam product suites designed for every business

Veeam Backup & Replication and Veeam ONE™ are better together. Veeam combines its two marquee solutions to help businesses maintain a High Availability data center through five key capabilities, including high-speed recovery, data loss avoidance, verified recoverability, leveraged data and complete visibility.

Veeam Availability Suite

combines the industry-leading backup, restore and replication capabilities of Veeam Backup & Replication with the advanced monitoring, reporting and capacity planning functionality of Veeam ONE to deliver the Availability your business needs to remain Always-On.

Veeam Backup Essentials™

is a powerful, easy-to-use and affordable backup and Availability solution designed for small businesses with less than 250 employees and virtual environments of up to 6 CPU sockets. Veeam Backup Essentials delivers the exact same functionality as Veeam Availability Suite with a savings of up to 60% or more.

- **Data Domain accelerated restores** use custom tailored logic during both backup and restore time to ensure maximum full VM restore performance. A portion of this logic introduces changes to the way backups are created on Data Domain storage, so a majority of the performance increase is experienced on newly created backups.
- **Direct restore from tape.** Now, users can perform a full VM restore directly from tape, without the requirement of staging the necessary VM backup files in a repository first. This improves RTO and eliminates the need of locating a repository with sufficient, free disk space to accommodate all of the backup files required to perform the restore. Performing a restore through a staging repository remains an option for when you need to restore a large number of VMs from the same backup file, in which case a restore through a staging repository may improve recovery times.

Engine enhancements. Veeam Backup & Replication 9.5 also includes a wide range of additional enhancements enabling users to scale for very large environments and maintain efficiency when processing jobs containing thousands of VMs or millions of files.

- **Major configuration database optimizations** allow for queries to complete faster while simultaneously reducing back-end SQL Server load, significantly improving user interface responsiveness and job performance. Please note that due to the fact that a portion of these optimizations leverage advanced capabilities available only in SQL Server 2008 or later, SQL Server 2005 is no longer supported as the configuration database.
- **Accelerated metadata processing** improves the performance of jobs containing VMs with a large number of supported applications installed, as well as when applications require large amounts of metadata to be stored as part of the backup (for example, Microsoft SharePoint server with thousands of sites).
- **Purpose-built user interface controls** improve responsiveness and reduce the configuration database load on grids with tens of thousands of objects, for example, when a user clicks on the Backups node of the management tree.
- **File to Tape performance** has improved by up to 50x when processing large amounts of very small files, making it up to 50% faster than leading legacy tape backup solutions on the same workload. The new engine was tested with 20 million files per job, enabling users to efficiently protect unstructured data to tape or VTL targets.

Advanced Resilient File System (ReFS) integration for Windows Server 2016.

The new ReFS 3.1 file system offers greater performance and capacity efficiencies for large-scale datasets, while ensuring backup data resiliency and the protection of business-critical applications through:

- **Fast clone technology** allowing for the creation and transformation of synthetic full backup files to happen up to 20x faster for shorter backup windows and a significantly reduced backup storage load. Backup and restore performance can be further improved with automatic storage tiering provided by a Storage Spaces Direct-based backup repository with an SSD tier
- **Reduced backup storage consumption** with spaceless full backup technology preventing duplication from occurring, resulting in raw disk space consumption by a Grandfather-Father-Son (GFS) backup archive that rivals deduplicating storage appliances. Further, unlike deduplicating storage, by integrating software dedupe and encryption with advanced ReFS capabilities, these storage savings remain even for encrypted backup files
- **Ensuring backup archive integrity** and addressing silent data corruption (“bit rot”) by monitoring and proactively reporting data corruption with ReFS data integrity streams, including automated and seamless healing of corrupted backup file data blocks inline during restore or during periodic scans of the ReFS data scrubber by leveraging Storage Spaces mirror and parity sets.

Supported environments

VMware infrastructure*

Platforms

- vSphere 6.0
- vSphere 5.x
- vSphere 4.1

Hosts

- ESXi 6.0
- ESXi 5.x
- ESX(i) 4.1

Software

- vCenter Server 6.0 (optional)
- vCenter Server 5.x (optional)
- vCenter Server 4.1 (optional)
- vCloud Director 5.5, 8.0 (optional)

*Only English version of VMware infrastructure is supported

Microsoft infrastructure

Platforms

- Windows Server 2016
- Windows Server 2012 R2
- Windows Server 2012
- Windows Server 2008 R2 SP1

Hosts

- Windows Server Hyper-V 2016
- Windows Server Hyper-V 2012 R2
- Windows Server Hyper-V 2012
- Windows Server Hyper-V 2008 R2 SP1

* Including Microsoft Hyper-V Server (free hypervisor)

Software

- Microsoft System Center Virtual Machine Manager 2016 (optional)
- Microsoft System Center Virtual Machine Manager 2012 R2 (optional)
- Microsoft System Center Virtual Machine Manager 2012 SP1 (optional)
- Microsoft System Center Virtual Machine Manager 2008 R2 SP1 (optional)

Advanced ReFS integration requires a Windows Server 2016-based backup repository backed by a local volume or shared folder. A backup repository must be created after upgrading to 9.5, and backup files must be created on the ReFS volume by the backup job, instead of being copied from another repository.

All of the enterprise scalability enhancements are available in all three product editions, as well as Veeam Backup Free Edition.

FULL integration with Microsoft 2016 data center technologies

Veeam's FULL integration with Microsoft 2016 data center technologies modernizes private cloud platforms and enterprise applications through full support for:

- **Windows Server 2016**, enabling users to install Veeam Backup & Replication components and protect guest VMs running on Windows Server 2016 with application-aware processing and guest file system indexing — all without requiring a direct network connection to the processed Windows 10 or Windows Server 2016 VMs, by leveraging new PowerShell Direct capabilities
- **Microsoft Hyper-V 2016 and Microsoft System Center Virtual Machine Manager 2016 (SCVMM)**, including:
 - **Support for the new Hyper-V 2016 backup framework** that is not reliant on volume snapshots by software or hardware VSS providers coordinated with guest VSS processing. This dramatically improves the Hyper-V backup success ratio in large and busy environments. Please note that both on-host and off-host backup modes remain supported with the new framework
 - **Support for Hyper-V's Resilient Change Tracking (RCT)** reduces complexity by eliminating the need to run an additional filter driver in the parent partition for changed block tracking functionality for backups, replicas and restores. Unlike Veeam's proprietary changed block tracking, RCT is also supported with third-party SMB3 storage
 - **Support for Microsoft Hyper-V hosts installed on Nano Server** in on-host backup mode, including support for Storage Spaces Direct, enabling users to immediately deploy Microsoft's recommended Hyper-V 2016 architecture, reducing the size of data center footprints
- **2016 Microsoft enterprise applications.** Support for 2016 releases of Microsoft enterprise applications is also included, providing application-aware processing for Microsoft Active Directory, Exchange, SharePoint and SQL Server, as well as application item-level recoveries through the corresponding Veeam Explorers™ for each application, ensuring high-speed recovery through fast RTOs of < 15 minutes.

All functionality is available in all product editions, including Veeam Backup Free Edition.

Direct Restore to Microsoft Azure

Direct Restore to Microsoft Azure delivers cloud restore for backups created by ANY Veeam product, optimizing resource allocation to deliver improved scalability and increased IT efficiency, while minimizing operating costs and limiting capital expenditures. It enables users to take on-premises workloads and restore or migrate them to Azure through an automated P2V or V2V conversion process. Users can:

- Quickly restore Windows and Linux-based VMs, physical servers or endpoints to Azure to minimize business disruption
- Execute planned workload migrations from on site to the cloud to reduce on-site resource constraints
- Easily create an Azure-based environment for development and testing. For example, users can test patches and updates to mitigate risks associated with new application version deployment.

In comparison to the technology preview of the Direct Restore to *Microsoft Azure* appliance released in March 2016, the following new functionality has been added:

- **Restore directly** from a UI without needing to deploy an Azure appliance, copying backup files to it or managing the process in a separate UI. Now, users can simply right-click any backup and restore it directly to Azure
- **Restore Linux computer backups** created by Veeam Backup & Replication and Veeam Agent for *Linux*, including automated UEFI to BIOS conversions
- **Perform parallel disk restore** for faster restore of computers with multiple disks
- **The Azure proxy** accelerates restores up to 10x by optimizing data transfers to the Azure data center. By leveraging Veeam Cloud Connect technology, data transfers are performed over a single port using encrypted TLS connection, simplifying firewall configurations and removing the need to establish VPN connections to Azure. The Azure proxy VM takes just a few clicks to deploy directly from the Veeam UI, and can be powered off automatically after specific periods of inactivity to reduce Azure consumption costs. Using the Azure proxy is optional
- **Tighter Azure integration** includes the automated installation of Azure Virtual Machine Agent for Windows VMs, the enabling of Windows firewall rules for Remote Desktop and support for the new Azure Resource Manager deployment model

Direct Restore to *Microsoft Azure* is available in all product editions, including Veeam Backup Free Edition.

Instant Recovery from ANY backup

Veeam invented Instant VM Recovery. Now, we are introducing Instant Recovery for physical computers! Veeam Backup & Replication 9.5 enables users to perform instant recovery of endpoints and physical servers into a Hyper-V VM. This provides the ability to:

- Immediately spin up a failed physical server from a backup, providing time to perform troubleshooting and/or acquiring replacement parts
- Run lost laptops directly from their last backup until a replacement is acquired, providing users access via an RDP connection from any thin client that supports RDP (e.g., a smartphone, a tablet)
- In conjunction with Veeam Cloud Connect, enterprises and service providers can manage complete disaster recovery (DR) of remote offices and tenant locations by spinning up backups delivered to the main data center by Veeam Cloud Connect, as Hyper-V VMs

Instant Recovery is supported from backups created by Veeam Endpoint Backup FREE 1.5, but will work best with Veeam Agent for *Windows* 2.0 or later due to additional information collected about the computer during backup.

Instant Recovery is available in all product editions, including Veeam Backup Free Edition. Please note that this functionality requires Microsoft Hyper-V. If you do not have a Hyper-V infrastructure, you can simply enable the Hyper-V role on the backup server itself.

Nimble Storage Snapshot integration

Expanding on existing integrations with Hewlett Packard Enterprise (HPE), NetApp and Dell EMC, Veeam extends its direct Storage Snapshot support to Nimble Storage users to help reduce the impact on production environments and achieve lower recovery time and point objectives (RTPO™) with:

- **Backup from Storage Snapshots.** Lower the additional impact from backup activities on production storage by retrieving VM data from storage snapshots on primary storage and replicated copies on secondary storage
- **Veeam Explorer for Storage Snapshots.** Recover individual application items, guest files or entire VMs quickly and efficiently from storage snapshots on primary storage and their replicated copies on secondary storage systems — whether they were created by a Veeam job or a native snapshot scheduler

- **On-Demand Sandbox™ for Storage Snapshots.** Use storage snapshots on primary and secondary storage systems to create complete isolated copies of production environments in just a few clicks for dev/test and troubleshooting purposes

Nimble Storage Snapshot integration requires Enterprise Plus edition, with the exception of Veeam Explorer for Storage Snapshots which is available in all product editions, including Veeam Backup Free Edition.

Enhanced VMware vCloud Director Support for Service Providers

Maintaining IT efficiency and agility requires a new approach to keeping Infrastructure as a Service (IaaS) models Always-On. Simplify management, increase efficiency and improve confidentiality by empowering vCloud Director tenants with a self-service backup and restore portal based on Veeam Backup Enterprise Manager, including:

- **Native vCloud authentication and integrated access scoping** allows tenants to continue to use their existing vCloud Director credentials for the self-service portal and restricts them from being able to backup and restore only the VMs belonging to their respective organizations. This enhances the tenant experience, as well as reduces costs for the service provider, as any tenant change, such as disabling a tenant, changing passwords or adding new vApps or VMs, is immediately reflected in the portal
- **Self-service backup** allows tenants to maintain better control over their backups by controlling existing jobs and creating new ones. Job setup is simplified so tenants only need to select VMs to perform backups of, as well as select essential parameters such as guest credentials, retention and notifications. Tenants are blocked from accessing advanced settings, such as repository or backup mode selection, which are managed by service providers through job templates
- **Self-service restore** allows tenants to perform a wide variety of restore options for VMs that Veeam Backup Enterprise Manager currently provides including application items, guest files, full VM and full vApp restores. These restores can now be easily performed in just a few clicks by tenants themselves, improving RTOs and reducing costs for service providers

Access to the self-service backup and restore portal requires the Enterprise *Plus* edition.

Additional enhancements

As a result of ongoing research and development efforts and in response to customer feedback, Veeam Backup & Replication 9.5 also includes an extensive range of additional features and enhancements, including the most significant listed below. All enhancements are available in all product editions featuring the corresponding functionality, unless stated otherwise.

Engine

- **Parallel processing of per-VM backups.** Health check and Compact operations will now process each backup file chain in parallel when per-VM backup file chains are used.
- **Proxy affinity.** This new backup repository setting allows users to specify backup proxies which are allowed to perform backups to and restores from the chosen repository. This capability is useful in a variety of scenarios including keeping backup traffic local to multiple all-in-one Veeam backup appliances. This functionality is available in Enterprise and Enterprise *Plus* Editions only.
- **Retention check after backup job failure.** Jobs will now apply a retention policy even if the backup itself fails. This will allow customers with an overfilled backup repository to lower the retention in the job settings, and apply the new setting so new backups can be created. However, please note that jobs in forever forward incremental backup are unable to simply delete the oldest backups due to a full backup file merge requirement.
- **GFS retention enhancement.** To reduce the requirements for archive repository disk space, the oldest GFS full backup will now be removed before a new GFS full backup file is sealed and a new synthetic full is created.

- **Backup Copy job performance enhancements.** Backup Copy jobs should now initialize much faster and no longer cause load on virtual infrastructures due to obtaining the required information about processed VMs from the configuration database instead of the infrastructure.
- **Preferred networks for Linux.** Preferred network settings now also apply to managed servers running Linux.
- **Network throttling for Quick Migration.** Quick Migration operations will now adhere to network consumption throttling rules.
- **Restore audit data retention.** Restore operations audit events will now adhere to global event retention rules to avoid overfilling the configuration database.
- **Third party components updated.** A number of third party engine components have been updated for enhanced stability and security, particularly OpenSSL to address its latest vulnerabilities.

vSphere

- **Direct NFS priority over Hot Add.** To prevent undesired VM stun issues from hot adding virtual disks located on an NFS share, Intelligent Load Balancing will not leverage Virtual Appliance (hot add) proxies as long as at least one Direct NFS capable proxy is available.
- **Direct NFS proxy location awareness.** Intelligent Load Balancing now automatically selects the best Direct NFS proxies based on the number of hops to the datastore, providing optimal proxy selection in distributed environments.
- **Thick disk type selection.** Users can now choose thick disk type (lazy zeroed or eager zeroed) when performing a full VM restore or setting up a replication job. Choosing to preserve the source disk type will also distinguish between and preserve the correct thick disk type.
- **Replica VM count balancing.** When replicating to a cluster, each replica VM is now created on the host with least VMs registered at the time of replica VM creation.
- **NBD connections limit increase.** The legacy limit for the maximum amount of virtual disks processed by NBD transport has been increased from 7 to 28 for ESXi 5.0 or later hosts, based on their architectural differences around NFC connections handling.

Hyper-V

- **Performance enhancements.** Jobs processing legacy Hyper-V host versions (2012 R2 and earlier) should now initialize up to 2x faster due to the accelerating Building VMs list, CSV enumeration and VM ownership retrieval operations.
- **VLAN remapping.** Added the ability to map VLANs in virtual networks mapping the rules of the replication job wizard.

Primary storage integrations

- **Protocol selection.** For primary storage supporting multiple protocols (FC/iSCSI/NFS), users can now select the protocols used by Veeam to prevent backup jobs from attempting to connect to storage over undesired interfaces.
- **Proxy selection.** Users can now select the specific backup proxies to be used for storage rescan and backup from storage snapshot operations.
- **NetApp support enhancements.** Added support for NetApp Data ONTAP 9.0 and SVM Root Volume Protection feature, as well as automatic backup load balancing across logical interfaces (LIF).
- **HPE 3PAR support enhancements.** Added support for Virtual Domains and iSCSI VLAN tagging features.

Dell EMC Data Domain

- DD OS 5.7 support. Updated DDBoost SDK to version 3.1 for added support of DD OS 5.7.

HPE StoreOnce

- **Increased limits.** The maximum number of supported increments in a backup chain now depends on device capabilities, instead of being limited to seven for all StoreOnce models.
- **Traffic control.** The ability to control Catalyst traffic check summing and compression settings in the StoreOnce wizard has been added.
- **Bandwidth mode control.** The Catalyst bandwidth mode is primarily based on the Catalyst store setting, instead of being forced to high.
- **Catalyst over FC enhancements.** The reliability of establishing Catalyst over FC connection to StoreOnce in cases when all available FC connections are occupied has been increased.
- **Catalyst update.** The Catalyst SDK has been updated to version Asterisk2 featuring various performance optimizations.

Scale-out Backup Repository™

- **Temporary expansion.** Enterprise edition users are now allowed to add a fourth extent, even though no more than three extents can be online at the same time, with the fourth remaining in maintenance mode. This will help with upgrading scale-out backup repository capacity by attaching a larger storage unit, followed by evacuation of backups from the smallest one.

Application-aware processing

- **Oracle on SUSE support.** Added support for application-aware processing and redo log backup for Oracle servers installed on SUSE Linux Enterprise Server (SLES) versions 11 and 12.
- **Oracle Data Guard support.** Added support for application-aware processing and redo log backup for Oracle servers using Data Guard.
- **Veeam Backup for Microsoft Office 365 support.** Added support for application-aware processing of Veeam Backup for Microsoft Office 365 servers.

File level recovery

- **OES 2015 support.** Added support for file-level recovery from 64-bit NSS volumes and AD-enabled NSS volumes on Open Enterprise Server 2015.
- **Copy to credentials.** A file-recovery attempt to a shared folder requiring credentials will now prompt users for credentials with Multi-OS File Level Recovery.
- **File level recovery performance.** Increased Windows file-level recovery performance up to 3x depending on the scenario.

SureBackup

- **Domain Controller roles.** Added the dedicated Active Directory domain controller roles which instruct SureBackup jobs to perform authoritative or non-authoritative domain controller restore respectively.
- **Veeam Backup for Office 365.** Added the dedicated role for Veeam Backup for Microsoft Office 365 servers.

Veeam Explorers

- **Lazy database load.** All Veeam Explorers will now mount database files to restore from as needed, as opposed to automatically mounting all known databases at start up.
- **Traffic flow optimization.** Restore traffic no longer flows through the console, but goes directly from repository mount server to the target server.

- **Improved user interface.** All Veeam Explorers now feature context-sensitive toolbar ribbons.

Veeam Explorer for Microsoft Active Directory

- **Windows Server 2016 Directory Services support.** Added support for Active Directory object-level recovery from forests running in 2016 functional level (including user and computer account password restore).
- **Expiring links.** Uniquely, support for expiring links restore, a new feature of Windows Server 2016 Directory Services, includes export to LDF file, functionality that is not available in the native LDIFDE utility.

Veeam Explorer for Microsoft Exchange

- **Restore from Purges folder.** Added support for restoring items from the Purges folder used by Exchange when Litigation Hold or single-item recovery features are enabled. Veeam Explorer will present these items under the Litigation Hold Items and In-Place Hold Items mailbox folders, respectively, in the mailbox folder tree.
- **Veeam Backup for Microsoft Office 365 support.** Added support for restoring from archive databases (.ADB files) created by Veeam Backup for Microsoft Office 365 – both from local files or by connecting directly to an archive server.

Veeam Explorer for Microsoft SharePoint

- **SharePoint 2016 support.** Added support for item-level recovery from Microsoft SharePoint 2016 content databases.
- **Site restore report.** Added detailed site restore report detailing restore status for each site object.

Veeam Explorer for Microsoft SQL Server

- **SQL Server 2016 support.** Added support for database-level, table-level and SQL object-level recovery from Microsoft SQL Server 2016.
- **Additional table types support.** Added support for restoring SQL objects from the following table types: System-versioned temporal table, memory-optimized table (in-memory OLTP) and file table.
- **Restore performance enhancements.** Improved database restore performance up to 3x in all SQL Server deployment scenarios, including blob stores.

Veeam Explorer for Oracle

- **Dynamic parameters restore.** Added support for restoring dynamic database parameters.
- **Restore performance enhancements.** Slightly improved database restore times by accelerating specific database management operations.

Veeam Backup Enterprise Manager

- **Scalability enhancements.** The Enterprise Manager engine was heavily optimized for very large environments and tested against databases containing one million restore points. Additionally, reporting performance, web UI responsiveness and new backup server registration times were significantly improved for large environments.
- **Oracle database restore.** The self-service, application-item level recovery functionality was expanded with self-service Oracle database restores by delegated database administrators.
- **Exchange mailbox item restore improvements.** Added CAS server auto discovery and enhanced certificates handling logic.
- **Improved self-service capabilities.** In light of adding a self-service backup and restore portal for vCloud Director, the Enterprise Manager web UI was enhanced with new capabilities to perform Quick Backup operations on the VMs tab, as well as delete backup jobs, backup files and erase individual VMs content from multi-VM backup files.

- **1-Click FLR for agent backups.** Guest file system catalog search and 1-Click File Level Recovery is now supported for backups created by Veeam Agent *for Windows 2.0* and Veeam Agent for Linux 1.0.
- **Concurrent catalog search.** Multiple web UI users are now able to perform guest file system catalog searches concurrently without commonly experiencing timeouts.

Veeam Cloud Connect (Tenant)

- **Parallel processing.** Tenants can now backup or replicate multiple VMs and disks in parallel, based on the concurrent task limit set by the service provider, thus improving job performance on fast links. Please note that parallel processing applies to direct transport mode only, as built-in WAN accelerators will still process disks sequentially regardless of this setting.
- **Replication from backup in a cloud repository.** Tenants can now perform replication from a backup residing in a cloud repository, enabling a new DR option without generating additional network traffic or impacting production VMs.
- **Security enhancements.** Veeam Cloud Connect service will now attempt to use more secure TLS 1.2 and TLS 1.1 authentication algorithms when establishing a connection to the service provider. In addition, failover to SSL 3.0 has been explicitly disabled for all Veeam Cloud Connect components.
- **Configuration backup to cloud repository.** Added support for performing configuration backups to a cloud repository, except for those backed by a scale-out repository.

Veeam Cloud Connect (Service Provider)

- **Per-VM backup file chains support.** Cloud repositories can now be backed by backup repositories with the per-VM backup file chains setting enabled to improve scalability and better support for deduplicating storage appliances.
- **Scale-out Backup Repository support.** Cloud repositories can now be backed by scale-out backup repositories to simplify backup storage management and save costs for service providers. The supported process for migrating existing tenant backups from simple repositories to scale-out backup repositories will be provided by Veeam. For more information, please refer to [Veeam Cloud & Service Provider Forum](#).
- **Advanced ReFS integration support.** Cloud repositories backed by backup repositories meeting the requirements for Advanced ReFS Integration fully support the corresponding functionality.
- **Improved diagnostic logging.** Multiple improvements were made to specific areas of tenant job logging where it was possible to do so without exposing a tenant's confidential information.

Tape

- **Automatic tape driver cleaning.** Yes, finally! The backup server will now monitor tape drive status events and automatically perform a cleaning as required, as long as the cleaning cartridge is available in the tape library.
- **Tape job priority.** We have heard you loud and clear, and added an option to delay primary jobs start up while tape jobs are still processing some of the required backup files, instead of killing the tape jobs immediately.
- **Waiting for tape notification improvements.** The email report and job Action log message now contain information about the tape device and media pool that lacks free media.
- **Adjustable GFS media set retention.** Similar to simple media pools, it is now possible to change the retention for previously written tape media within any GFS media set.
- **Additional media set variable.** Added "month numeric" variable to media set naming variables.
- **Tape job wizard enhancements.** Now, you can select multiple files to add to a File to Tape job at once, see additional information about the selected media pool in the tape job wizard, and specify linked backup job wait time in hours (in addition to minutes).
- **Backup operator permissions.** Veeam Backup Operators user role is now allowed to perform essential tape infrastructure management operations such as inventory, eject, rescan etc.

- **Other optimizations.** Additional optimizations include multiple, under-the-hood enhancements improving stability and performance of GFS archival, parallel processing, tape encryption, file level recovery and catalog operations.

User interface

- **New VeeamZIP™ retention options.** Additional VeeamZIP backup retention options of three months, six months and one year have been added to existing options for customers using VeeamZIP as a VM archival tool.
- **Free space threshold for production datastores.** You can now set the percent of free disk space on the production datastore, indicating when jobs should issue a warning or fail completely instead of creating a VM snapshot to prevent the datastore from overflowing with snapshot data. This is an addition to the existing **BlockSnapshotThreshold** registry value (default is 2GB), which continues to serve as the last line of defense when the above functionality is disabled, as is the case for upgrading users. The new settings can be found under Options > Notifications.
- **Proxy selection.** You can now specify the proxy and disk type to use when exporting backed up volume as a virtual disk.
- **Restricted hours warning.** We will now display a warning if a user attempts to start a job during restricted hours. This is defined in the job's backup window setting.
- **Color themes.** For those of you who find Veeam Green to be too acidic, we now provide three additional color themes featuring neutral colors. The color theme is a per-user setting attaching to a specific backup server, allowing users to color-code backup servers to more easily distinguish between them during Alt-TAB.

PowerShell

- **More lenient execution policy support.** The Veeam PowerShell extension execution policy requirement has been lowered from RemoteSigned to Bypass.
- **On-going enhancements** with new cmdlets added to cover all new 9.5 functionality, as well as multiple enhancements to existing cmdlets based on user feedback.

Enhancements for service providers

- **Configuration backup and restore enhancements.** By popular demand, the configuration backup email report now includes backup server name. Additionally, Veeam Cloud Connect server configuration database migration is now fully supported by a configuration restore in Migration mode.
- **RESTful API enhancements.** Added support for managing Backup Copy jobs and backup files, expanded existing APIs for file level recovery and job scheduling according to feedback, and implemented many smaller enhancements.
- **Trial VMs.** With per-VM rental licenses, the product will now track newly added VMs separately for the purpose of built-in usage reporting. Such VMs will not be included in the usage reports until the following month.



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