

OOB Data Protection with DDVE in MS Azure By Information and Communication Technology W.L.L

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Information and Communication Technology W.L.L “ICT” is pleased to assist their customers with backup and recovery objectives. This solution is for customers whose growing business is experiencing explosive data growth and facing new demands such as Big Data and Cloud, all while being pressured to reduce costs and meet stringent service level agreements. Dell EMC PowerProtect DD series appliances are the solution for these challenges. DD Series is the ultimate protection storage appliance. DD series is the next generation of Data Domain appliances from Dell EMC, the #1 customer choice in data protection for the past decade. **Dell EMC PowerProtect DD Virtual Edition** (DDVE) is a software-defined data protection appliance that delivers to you the benefits of the worlds most trusted protection storage and the agility, flexibility and efficiency that can be deployed on your own hardware or in the cloud.

DDVE maintains all of the core differentiating features of DD series. DDVE is fast and simple to download, deploy and configure, and can be up and running in minutes on any standard server, converged or hyper-converged system, or in the cloud. DDVE delivers increased transactional and operational efficiencies, reliability and lowers your total cost of ownership (TCO) by utilizing object storage in addition to block storage.

DDVE will provide customers with the following benefits:

- **Simple, Flexible, and Efficient** – configures and deploys in minutes; provides differentiating features of DD series like deduplication; grows as you scale in 1TB increments; runs on commodity servers, converged and hyper converged systems
- **Virtualized and Cloud Environments** – supports multiple hypervisors (VMware ESXi, Microsoft Hyper-V, and KVM); runs in AWS, AWS GovCloud, Azure, Azure Government Cloud, Google Cloud Platform, and VMware Cloud on AWS
- **Transactional and Operational Efficiencies** – ability to write or backup data into the object store directly in addition to block storage; supports AWS S3 and Azure Hot Blob object stores
- **Manageability** – provides a single point of management with PowerProtect DD Management Center (DDMC); configures and deploys using VMware vSphere and Microsoft Hyper-V Manager. Integrates with Dell EMC CloudIQ for proactive monitoring.

DDVE enables data protection in the cloud for applications running in the cloud. DDVE in the cloud allows for both backup and replication. Data can be moved to an on-premise DD series and backed up to the cloud, or even backed up and replicated between two instances of DDVE running in the cloud or on-premise. This allows multiple DDVE instances to be spun up in other regions to backup and replicate the data over, keeping everything consistent.

DDVE scales up to 96TB per instance on-prem. When deployed in AWS, Microsoft Azure, or Google Cloud DDVE can support up to 256TB instances. You can pay as you grow in as little as 1TB increments and distribute this capacity in multiple instances as needed across the environment.

In the proposal that follows we'll describe **PowerProtect DD Virtual Edition** and how it will assist customers in reducing costs, while improving both data protection and productivity wherever your data resides.

We look forward to working with you.

Sincerely,

Dell Technologies Data Protection Solutions Team - Qatar

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1 Business Needs and Requirements

Customer's IT is required to select a vendor to provide a compatible and efficient backup solution to complement the current Dell PowerProtect Data Protection Solution and to provide an out of country strategy for backups (or subsets) to be replicated to a software defined backup storage hosted on MS Azure.

The selected vendor should carry out the procurement and delivery of the backup solution covering the professional services that includes planning, designing, deployment and implementation of the solution in accordance with the detailed statement of work, configuration review and best practices.

The backup solution is required to help prevent data loss, recover from ransomware and malware attacks in general, minimize downtime and ensure business continuity.

The solution must be able adhere to customer's accepted RPO and RTO policies.

1.1.1.1 Description

Customer's IT intends to deploy a reliable backup solution that compliments the current Dell PowerProtect Data Protection platform and to provide a software defined storage to replicate backup copies to MS Azure and to act as out of country backup copies.

In the proposal that follows we'll detail how Dell PowerProtect Set of Solutions will help the customer speed up backup processes, improve productivity, and enhance data protection wherever your data resides and mainly in Microsoft Azure customer's Tenant accounts.

2 Solution Description

2.1 DDVE

Dell EMC PowerProtect DD series appliances are the ultimate protection storage appliances. DD series is the next generation of Data Domain appliances from Dell EMC, the #1 customer choice in data protection for the past decade.

Dell EMC PowerProtect DD Virtual Edition (DDVE) is a software-defined data protection appliance that delivers to you the benefits of DD series, the ultimate protection storage appliance. DDVE provides agility, flexibility and efficiency that can be deployed on your own hardware or in the cloud.

This next generation software-defined data protection appliance maintains all the core differentiating features of DD series. DDVE is fast and simple to download, configure and deploy, and can be up and running in minutes on any standard server, converged or hyper-converged system. DDVE delivers increased transactional and operational efficiencies, reliability and lowers your total cost of ownership (TCO) by utilizing object storage in addition to block storage.

DDVE is designed for a variety of use cases. DDVE scales from 0.5TB to 96TB on-prem, when deployed in AWS, Microsoft Azure or Google Cloud DDVE can scale up to 256TB per instance and runs on VMware vSphere ESXi, Microsoft Hyper-V and in KVM environments. DDVE can run on any standard hardware supported by the hypervisor, so you can leverage existing infrastructure to deploy protection storage. DDVE can also run on Amazon Web Services (AWS), AWS GovCloud, Azure, Azure Government Cloud, Google Cloud Platform and VMware Cloud on AWS.

With the movement companies are making to take advantage of the agility and flexibility of the public, private and hybrid cloud, Dell EMC wanted to give those customers the same protection they'd expect from a physical DD series appliance – high-speed, variable length deduplication, unparalleled data integrity to ensure reliable recovery, and includes DD Boost, DD Replicator and DD Encryption.

DDVE can now run in AWS, AWS GovCloud, Azure, Azure Government Cloud, Google Cloud Platform and VMware Cloud on AWS. DDVE can now deliver increased transactional and operational efficiencies, reliability and lower TCO by utilizing object storage in addition to block storage.

DDVE in the cloud also allows for replication. You can move data to an on-premise DD series appliance and back to the cloud, or even replicate data between two instances of DDVE running in the cloud (must be in the same cloud environment). This can enable you to spin up multiple DDVE instances in other regions or in the same region. (Note that replication between AWS and Azure is not supported.)

PowerProtect DD Management Center (DDMC) provides the same dashboard-based resource management, monitoring and reporting center to DDVE that PowerProtect DD customers are used to. DDMC provides you the ability to gain aggregated management for multiple systems, manage capacity and replication, and monitor the health and status of your DDVE resources. DDMC runs in AWS, Azure, and Google Cloud Platform.

Support for object storage in the cloud results in increased transactional and operational efficiencies, better reliability, and lower TCO by utilizing object storage in addition to block storage. DD series deduplication storage solves many of the challenges associated with traditional backup, archive and replication by reducing the amount of disk storage needed to retain and protect data.

With variable-length deduplication, storage requirements are significantly reduced making disk a cost-effective alternative to tape backup. To help meet backup and recovery objectives and service level agreements, DD series delivers an immediate return on your investment benefits with significantly shorter backup windows.

2.1.1 DDVE Use Cases

DDVE is an ideal backup solution for:

- **Remote Office/Branch Office (ROBO)** – Many enterprises that have remote offices all over the world face the challenge of managing, monitoring, and protecting data in such environments. PowerProtect DD appliances working in parallel with DDVE can help meet these data protection challenges. With a DD series appliance at the main data center and a DDVE at each branch office, you get the assurance that your data at these branch offices is protected. The entire data protection environment can be managed centrally with DDMC. If a branch office has a failure or must shut down, you have the peace of mind that the protected data is not lost. DDVE will divert that data into another remote office or stores it on-premises.
- **Small Business/Entry Market** – DDVE supports small business/entry market customers allowing you to start as small as 0.5TB per instance and grow as needed in 1TB increments. This allows DDVE to support businesses with smaller capacity workloads and limited budgets or a single department of a larger business that needs its own data protection storage solution with room to grow to a DD series appliance when needed.
- **Multi-tenant Environments** – DDVE supports secure multi-tenancy. This allows DDVE to address new use cases such as service providers and large enterprises who are looking for easy to manage, software-only protection storage that can be quickly and swiftly delivered as a service.
- **Converged Infrastructure** – DDVE can also be deployed in converged infrastructure environments with support for Dell EMC VxRail. Data protection is an essential component of the software-defined data center, which requires a solution that can keep up with today's massive data growth, backup window pressures and the demands of virtualization. DDVE offers the simplicity of deployment and flexibility required to ensure customers that their VxRail converged infrastructure is properly protected.
- **In-cloud Workloads and Out-of-Country copy** – DDVE running in public cloud environments, such as: AWS, AWS GovCloud, Azure, Azure Government Cloud, Google Cloud Platform and VMware Cloud on AWS can protect applications running in the cloud and also supports replication from on-premises to the cloud. With DDOS 7.2, DDVE has increased in-cloud restore performance by up to 3x when compared to the previous version.

2.1.2 Dell EMC DD Replicator

DD Replicator software provides automated, policy-based, network – efficient and encrypted replication for disaster recovery (DR) and multi-site backup and archive consolidation. DD Replicator software asynchronously replicates only compressed, deduplicated data over the WAN. Cross-site deduplication further reduces bandwidth requirements when multiple sites are replicating to the same destination system. With cross-site deduplication, any redundant segment previously transferred by any other site or as a result of a local backup or archive will not be replicated again. This improves network efficiency across all sites and reduces daily network bandwidth requirements making network-based replication fast, reliable and cost- effective.

In order to meet a broad set of DR requirements, DD Replicator provides flexible replication topologies, such as full system mirroring, bi-directional, many-to-one, one-to-many, and cascaded. In addition, you can choose to replicate either all or a subset of the data on the DD series appliance. For the highest level of security, DD Replicator can encrypt data being replicated between DD series appliances using the standard Secure Socket Layer (SSL) protocol.

2.1.3 Dell EMC DD Boost

DD Boost advances DD series performance and simplicity differentiators over that of competitive products by providing advanced integration between DD series and leading backup and enterprise applications. DD Boost distributes parts of the deduplication process to the backup server or application client to increase the aggregate throughput to a DD series appliance. In addition, DD Boost simplifies backup administration by offering the ability to manage DD series replication through the application. Finally, DD Boost eliminates the need for Ethernet layer aggregation to leverage the full capabilities of multiple Ethernet ports.

2.1.4 Dell EMC DD Encryption

DD Encryption provides inline encryption of user data at rest, enabling organizations to enhance the security of their user data stored on DD series. DD Encryption seamlessly integrates with DD series high-speed, inline deduplication process and encrypts data before it is written to disk. Utilizing encryption—with AES-128 or AES-256 algorithms—allows user data to be protected in case of theft.

Encrypting data at rest satisfies some aspects of internal governance rules and compliance regulations and uses RSA® BSAFE FIPS 140-2 validated cryptographic libraries.

2.1.5 DDVE Licensing

DDVE is now available as a subscription or via a TLA.

The following capabilities are included with the DDVE license:

- DD Boost, increase backup throughput speeds
- DD Encryption, for enhanced security of data
- DD Replicator, which enables network-efficient replication for faster time-to-DR readiness

2.1.6 Maximum Throughput Speed

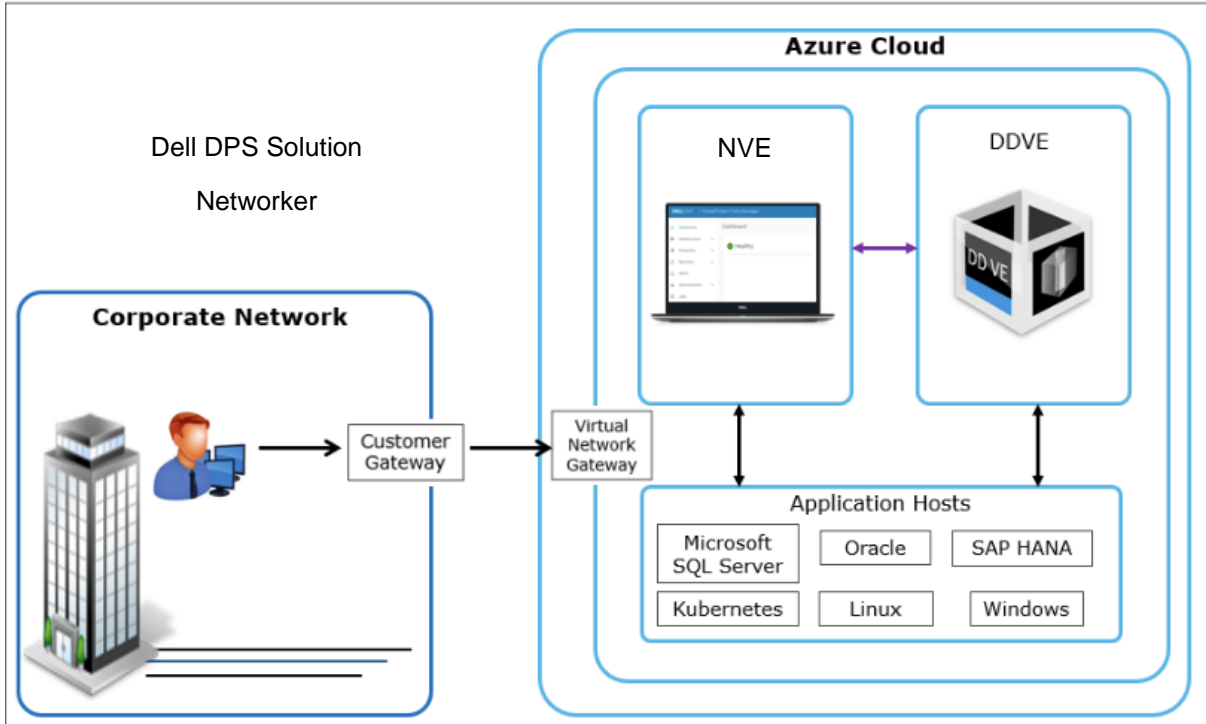
DDVE provides the following maximum throughput speed:

	DDVE* at 16TB	DDVE* at 96TB
Maximum Throughput	2.1 TB/hr.	4.00 TB/hr.
Maximum Throughput (DD Boost)	5.6 TB/hr.	11.20 TB/hr.

* Throughput measured running DDVE with 16TB & 96TB instances: Host server: 2x Intel Xeon CPU (6 Cores each) @ 2GHz, 128GB memory, 2x10GbE NIC; Storage: DAS with 3TB 7200 RPM SAS Drives, RAID6, battery-backed HBA Cache Enabled, Disk Cache Disabled.

3 Architecture overview

3.1 Solution High Level Architecture



The following diagram represents the architecture of DDVE on Microsoft Azure Cloud

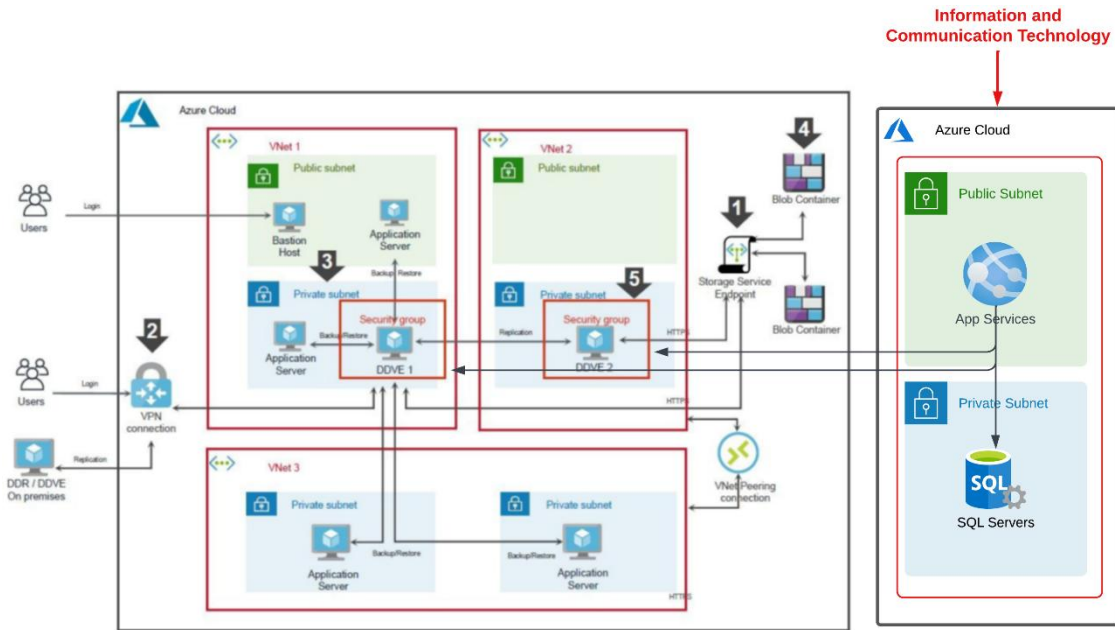
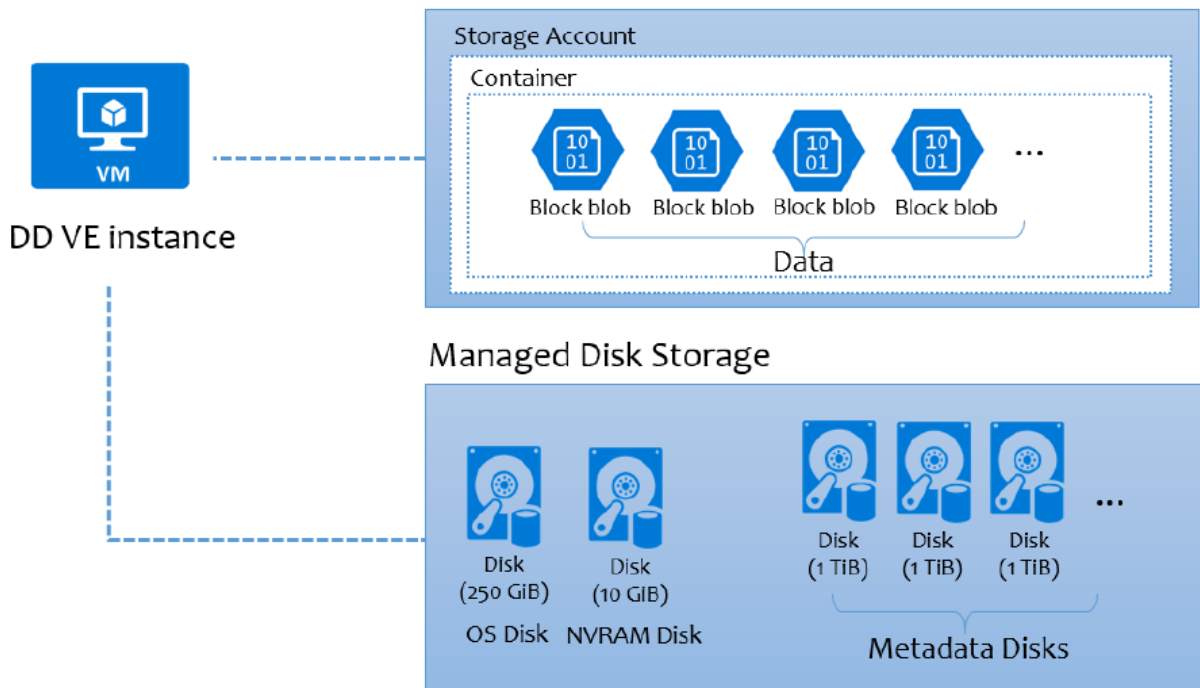


Table 2. Dell APEX Protection Storage on Azure resource configuration size

Type	Resource configuration size
Dell APEX Protection Storage on Block storage	<ul style="list-style-type: none"> Dell APEX Protection Storage on Block storage: Up to 16 TB. Dell APEX Protection Storage capacity is available in 1 TB increments starting at 512 GB.
Dell APEX Protection Storage on Hot Blob storage (recommended)	<ul style="list-style-type: none"> Dell APEX Protection Storage capacity is available up to 256 TB.

Hot Blob Storage



1. To keep data traffic between DDVE and Azure storage within the Azure infrastructure, Dell Technologies recommends that you create an Azure storage service endpoint.

The service endpoint keeps DDVE from depending on a NAT Gateway or Public IP address to access the hot blob container.

2. Dell Technologies recommends a VPN connection to replicate data from an on-premises host to DDVE in the cloud or the opposite way. This approach keeps data transfers secure.
3. DDVE is categorized as a backend server. It must be kept in a private subnet with a private address. Never set a public IP address for DDVE.
4. The storage account must be in the same region where the DDVE instance is running. A separate hot blob storage account with a container is required for each DDVE.
5. All DDVE instances must be secured with the appropriate security group entries.

Typically, SSH (Port 22) or HTTPS (Port 443) is used for DDVE inbound access. HTTPS (443) must be allowed for outbound Azure hot blob container access for DDVE. TCP ports 2049 and 2051 are used for DD Boost and replication purposes.

3.2 Understanding compute and storage requirements

Azure provides several types of disk storage with different performance characteristics such as IOPS, throughput, latency, and so on.

- Standard hard drive is recommended as a cost-effective solution.
- Premium SSD is recommended as a performance-optimized solution.

Select the appropriate Dell APEX Protection Storage virtual machine instance type according to capacity and workload.

The metadata requirements that are listed here are based on 10X deduplication ratio and 2X compression. If your workload has a higher deduplication ratio, add more metadata disks as required.

Table 3. Dell APEX Protection Storage on Azure: Performance-optimized solution with Premium SSD

Instance type	Standard_D4ds_v5	Standard_D8ds_v5	Standard_D16ds_v5	Standard_D32ds_v5
CPU	4	8	16	32
Memory (GiB)	16	32	64	128
System Disk	250 GiB Premium SSD root disk	250 GiB Premium SSD root disk	250 GiB Premium SSD root disk	250 GiB Premium SSD root disk
	10 GiB Premium SSD NVRAM disk	10 GiB Premium SSD NVRAM disk	10 GiB Premium SSD NVRAM disk	10 GiB Premium SSD NVRAM disk
Storage capacity	16 TB	32 TB	96 TB	256 TB
Metadata disks	Premium SSD Up to 2 X 1 TiB	Premium SSD Up to 4 X 1 TiB	Premium SSD Up to 10 X 1 TiB	Premium SSD Up to 13 X 2 TiB

Table 4. Dell APEX Protection Storage on Azure: Cost-effective solution with Standard HDD

Instance type	Standard_D4ds_v5	Standard_D8ds_v5	Standard_D16ds_v5	Standard_D32ds_v5
CPU	4	8	16	32
Memory (GiB)	16	32	64	128
System Disk	250 GiB Standard HDD Root disk	250 GiB Standard HDD Root disk	250 GiB Standard HDD Root disk	250 GiB Standard HDD Root disk
	10 GiB Standard HDD NVRAM disk	10 GiB Standard HDD NVRAM disk	10 GiB Standard HDD NVRAM disk	10 GiB Standard HDD NVRAM disk
Storage capacity	16 TB	32 TB	96 TB	256 TB
Metadata disks	Standard HDD Up to 2 X 1 TiB	Standard HDD Up to 4 X 1 TiB	Standard HDD Up to 10 X 1 TiB	Standard HDD Up to 13 X 2 TiB

- Standard SSD is also supported, but it is not the recommended configuration.
- Use the same disk type within a Dell APEX Protection Storage instance.
- Other instance types (Standard_F8, Standard_F8s, Standard_D4ds_v4, Standard_D4_V2, Standard_DS4_V2, Standard_D8ds_v4, Standard_D16_V3, Standard_D16s_v3, Standard_D16ds_v4, Standard_D32s_v3 and Standard_D32ds_v4) are still supported, but the new v5 instance types are recommended. For more information about the Azure DdsV5 series instance, see [Ddv5 and Ddsv5-series](#).

Table 5. Azure Hot Blob Storage Stream and MTree Counts

Storage capacity	Instance type	Supported concurrently active MTrees	Supported configurable MTrees	Stream Counts				
				Read	Write	Replication In	Replication Out	Combined
16 TB	Standard_F8s Standard_F8 Standard_D4ds_v4 Standard_D4ds_v5	6	100	30	45	45	42	60
32 TB	Standard_DS4_v2 Standard_D4_v2 Standard_D8ds_v4 Standard_D8ds_v5	14	100	50	90	90	82	90
96 TB	Standard_D16s_v3 Standard_D16_v3 Standard_D16ds_v4 Standard_D16ds_v5	32	100	50	180	180	100	180
256 TB	Standard_D32s_v3 Standard_D32ds_v4 Standard_D32ds_v5	128	128	110	540	540	220	540

4 Solution Details

4.1 Data Protection Solution Components

Customer would need to use 4 instances of DDVEs to be able to protect the below shared table of the sets of data and their respective retention policies:

Source Mtree	Size	Destination	Retention cycle
SAP	25 TB	DDVE	6 Monthly copies
Oracle	25 TB	DDVE	6 Monthly copies
SQL	10 TB	DDVE	6 Monthly copies
AD	0.2 TB	DDVE	1 Monthly copies
Vmware	500 TB	DDVE	1 Monthly copies

Product Name	Qty	Module Name	Option Name	Qty
DDVE#1 256TB	1			
		PowerProtect DDVE	PowerProtect DDVE Subscription - SWAAA	1
		Existing Subscription	No Existing Subscription Selected	1
		PowerProtect DDVE	DD VE Capacity 36 Mo PP Subscription=CA	256
		Sftwr Svcs - Sub (VP)	ProSupport DDVE Sub Sftwr Spt-Maint, 36 Month(s)	1
		Infrastructure Deployment Svcs	ProDeploy Plus Data Domain Virtual Edition	1
DDVE#2 256TB	1			
		PowerProtect DDVE	PowerProtect DDVE Subscription - SWAAA	1
		Existing Subscription	No Existing Subscription Selected	1
		PowerProtect DDVE	DD VE Capacity 36 Mo PP Subscription=CA	256
		Sftwr Svcs - Sub (VP)	ProSupport DDVE Sub Sftwr Spt-Maint, 36 Month(s)	1
		Infrastructure Deployment Svcs	ProDeploy Plus Data Domain Virtual Edition	1
DDVE#3 40TB	1			
		PowerProtect DDVE	PowerProtect DDVE Subscription - SWAAA	1
		Existing Subscription	No Existing Subscription Selected	1
		PowerProtect DDVE	DD VE Capacity 36 Mo PP Subscription=CA	40
		Sftwr Svcs - Sub (VP)	ProSupport DDVE Sub Sftwr Spt-Maint, 36 Month(s)	1
		Infrastructure Deployment Svcs	ProDeploy Plus Data Domain Virtual Edition	1
DDVE#4 15TB	1			
		PowerProtect DDVE	PowerProtect DDVE Subscription - SWAAA	1
		Existing Subscription	No Existing Subscription Selected	1
		PowerProtect DDVE	DD VE Capacity 36 Mo PP Subscription=CA	15
		Sftwr Svcs - Sub (VP)	ProSupport DDVE Sub Sftwr Spt-Maint, 36 Month(s)	1
		Infrastructure Deployment Svcs	ProDeploy Plus Data Domain Virtual Edition	1

5 Solution Benefits

Dell EMC PowerProtect DD Virtual Edition (DDVE) is a software-defined data protection appliance that delivers to you the benefits of PowerProtect DD series appliances, the ultimate protection storage appliance. Dell EMC PowerProtect DD series appliances are the ultimate protection storage appliances. DD series is the next generation of Data Domain appliances from Dell EMC, the #1 customer choice in data protection for the past decade. DDVE provides agility, flexibility and efficiency that can be deployed on your own hardware or in the cloud.

#1 in Data Protection Appliance & Software Market*

Solution-level Simplicity | Single Vendor Worldwide Support

PROVEN AND TRUSTED
Dell EMC Data Protection

- Most comprehensive portfolio
- High performance & ease of growth
- High efficiency & low cost-to-protect

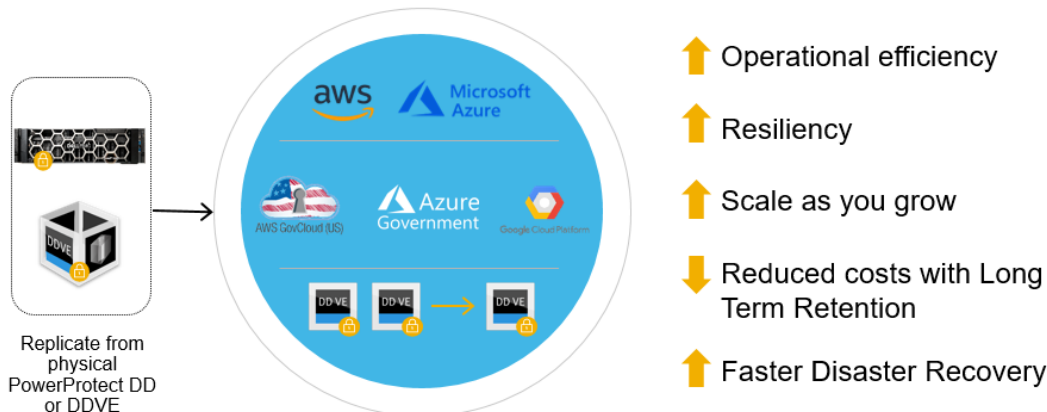
*Based on combined revenue from the IDC 1Q20 Purpose-Built Backup Appliance (PBBA) Tracker, with select Storage Software segments from the 1Q20 Storage Software and Cloud Services Qview.

Dell Technologies

DDVE is fast and simple to download, deploy and configure – and can be up and running in a matter of minutes. DDVE scales from 0.5TB to 96TB per instance on-prem. When deployed in AWS, Microsoft Azure, or Google Cloud, DDVE can scale up to 256TB per instance. DDVE runs on VMware ESXi, Microsoft Hyper-V, and in KVM environments. DDVE can run on any standard hardware supported by the hypervisor, so you can leverage existing infrastructure to deploy protection storage. DDVE can also run on Amazon Web Services (AWS), AWS GovCloud, Microsoft Azure, Azure Government Cloud, Google Cloud Platform and VMware Cloud on AWS.

DDVE is flexible, enabling you to move data to an on premise DD series and back to the cloud, or even replicate data between two instances of DDVE running in the cloud across regions. DDVE gives you the flexibility to keep a copy of your data on-premises and in the cloud.

Data protection in the cloud



DDVE provides you with the following benefits:

Simple, Flexible, and Efficient

- Configure and deploy in minutes
- A deduplication ratio of up to 50x
- Grow as you scale in 1TB increments
- Run on any commodity server, converged and hyper-converged
- Sold as a subscription

Virtualized and Cloud Environments

- Multiple hypervisors support: VMware ESXi, Microsoft Hyper-V, and KVM
- Run on Amazon Web Services, AWS GovCloud, Microsoft Azure, Azure Government Cloud, Google Cloud Platform, and VMware Cloud on AWS
- Supports up to 96TB instances on-prem and up to 256TB instances in cloud (AWS, Microsoft Azure and Google Cloud)

Transactional and Operational Efficiencies

- Ability to write or backup data into the object store directly in addition to block storage
- Can support AWS S3 and Azure Hot Blob object stores

Manageability

- Single point of management with PowerProtect DD Management Center (DDMC)
- Configure and deploy using VMware vSphere and Microsoft Hyper-V Manager
- Integrates with Dell EMC CloudIQ for proactive monitoring.

5.1.1 Highly Scalable

DDVE delivers software-defined protection storage at scale. DDVE is easily expandable with a single DDVE instance, now able to scale up to 96TB on-prem and 256TB in-cloud. You have the ability to purchase in 1TB increments and can deploy a DDVE instance for each TB of capacity in your environment. Plus, capacity can be easily moved between virtual systems and/or locations.

5.1.2 DDVE Delivers Best-in-Class Reliability

DDVE ensures the veracity of your protected data with end-to-end data verification, continuous fault detection and self-healing, full file system recoverability, and emulated NVRAM, among other features.

In addition, adding to the reliability and ease of use of DDVE is an automated deployment assessment tool that is run through the DD System Manager. This tool simplifies the deployment of a DDVE instance and runs a check against your environment to ensure that the storage meets basic configuration requirements. DDVE offers best in class reliability compared to any other software-defined protection storage solution.

5.1.3 Benefits of Running in a VMware Virtualized Environment

By running in VMware, DDVE gains additional benefits from the underlying VMware technology. DDVE supports VMware High Availability and Fault Tolerance, which help you meet availability needs and VMware Distributed Resource Scheduler optimizes performance.

5.1.4 Benefits of PowerProtect DD Management Center

PowerProtect DD Management Center (DDMC) provides the same dashboard-based resource management, monitoring and reporting center to DDVE that DD series customers are used to. DDMC provides you the ability to gain aggregated management for multiple systems, manage capacity and replication, and monitor the health and status of your DDVE resources. DDMC runs in AWS, Microsoft Azure, and Google Cloud Platform.

5.1.5 We are the Market Share Leader with PowerProtect Appliances

You don't get to be the undisputed market share leader for protection storage without doing a lot of things really well. All of our PowerProtect Appliances were designed from the ground up to be the storage of last resort in the ways that really matter supporting open systems, mainframes, I-series, Big Data, and both public and private clouds. Dell EMC leads the protection storage market by a wide margin, and now you know some of the reasons why.