

# White Paper

## PRIMERGY RDX Backup and Archiving Solution

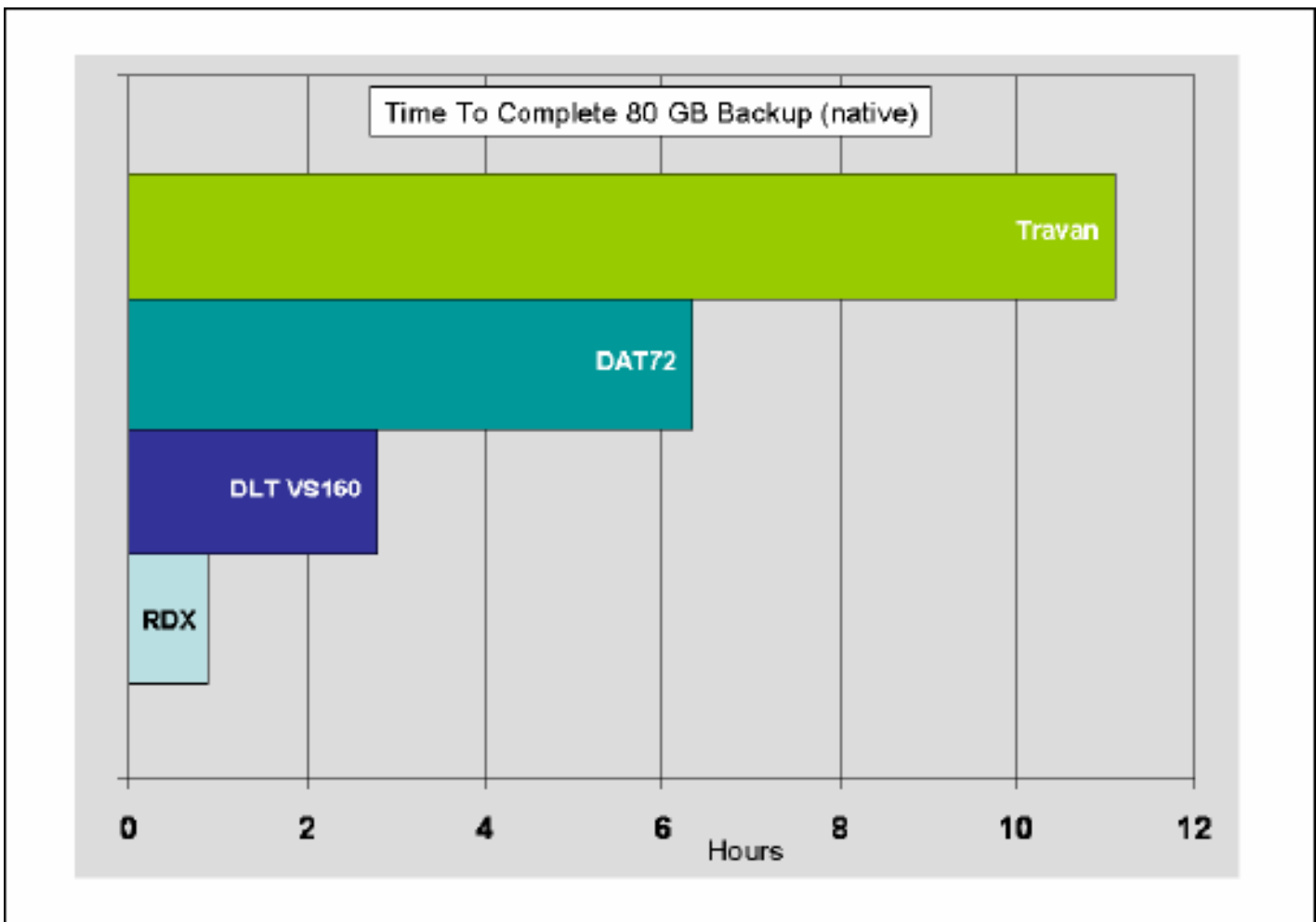


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# Introduction

## Introduction

Industry experts and storage vendors alike agree that customers should be able to choose between tape drives and disks so that their ideal backup solutions for storing data long-term can be ensured. Efforts to replace tape drives with various technologies have always failed, because they were never able satisfactorily to match or even surpass the advantages of tape-based technology in terms of its design, capacity, archival or price/performance benefits. The industry has therefore been searching for a technology that unites the advantages of the different solutions. This paper explores the benefits of the new mobile disk-based RDX (Random Access Disk) technology. RDX successfully and cost-effectively matches and surpasses tape-based solutions in all of its key aspects; in addition, it provides backup and retrieval speed with 99.999% reliability. The RDX drive thus offers the performance of a hard disk and the security and handling of a tape drive.



# What is an RDX system? What is an RDX system?

RDX is a removable hard disk drive system that handles and operates like traditional tape drives and media, yet has all of the advantages of disk-to-disk (D2D) systems. The RDX device enables backups in the customary manner through the transfer of the data to a removable data medium via an interface.

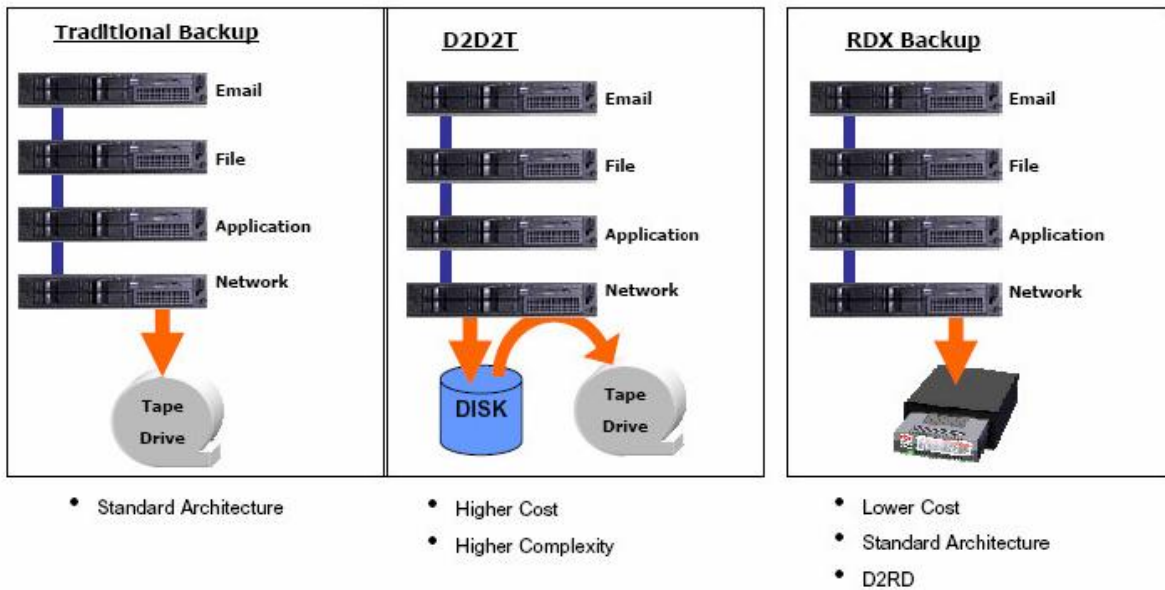
The RDX data medium looks just like a tape cartridge. However, its backup performance and reliability are far better. It takes the RDX drive less than an hour to back up 80 GB (uncompressed) at its average transfer rate of 25 MB per second. For the same operation with tape, a DLT V4 drive would need over two hours, a VXA-2 drive almost four hours and a DDS Gen5 drive more than seven hours.

And in restoring data, the RDX drive can leverage all of the read and write advantages of a hard disk drive. What also takes hours of searching on tape is accomplished in milliseconds with the RDX drive.

In short: the RDX backup system lets you vastly improve and reduce response times to customer queries by recovering the requested data in minutes instead of hours.

## Brief description of a D2D system

The most successful alternative to tape to date has been the disk-to-disk system. This is true despite the fact that these systems do not really replace tape drives so much as they change the backup architecture. Instead of backing up data directly to tape, D2D systems are added as an interim step to increase performance. The backup application copies the data to the D2D system and then later to tape in a subsequent step. In this way, the data is backed up for long-term storage and so that it can be recovered if it is lost completely. This architecture is commonly known as disk-to-disk-to-tape (D2D2T). While D2D2T has performance and availability advantages over tape, it does not really replace tape. These advantages come at the expense of increased cost, more laborious handling and system complexity.



Mode of operation of the various technologies

# Advantages of RDX

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## Removability and portability

The 3.5 inch RDX drive utilizes a unique removable data medium. This is also extremely portable thanks to its exceptionally rugged design. The RDX medium consists of a mobile 2.5-inch hard disk embedded in a highly durable housing. The same 2.5-inch drives are used in most laptops due to their small dimensions and locking head feature. With their protective, shock-proof design, RDX cartridges have passed drop tests from heights in excess of one meter onto a concrete floor without damage.

## Archiving and reliability

Small-form-factor hard disk drives such as are used in the RDX have considerable improvements in terms of mechanical reliability and service life. Design features such as ramp-load technology and fluid dynamic bearings eliminate any concern about damage to the hard disk surface as a result of the read/write head unit or disks sticking. In fact, these mobile HDDs now boast a mean time to failure of 500,000 hours.

## Compatibility

The RDX drive system is compatible with all common backup applications and will plug-and-play in all backup processes. IT experts do not need to change designs or complicated backup processes. Moreover, there are no extra costs required in order to leverage the benefits of using RDX backup technology.

## Simplicity and security

Anyone who has ever configured a multi-disk server knows that setup and security are never simple and can often be quite complex. RDX has all of the benefits of a disk drive, with no special setup required. Indeed, operating an RDX device with a backup application is easier than using a tape device with simple drag and drop icons.

# Advantages of RDX over tape drives

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### Performance

Like all tape drives, hard disk drives differ in throughput and performance from other drives. The advantage that disk drives have over tape is their ability to access data randomly once it has been stored. Even if data is written in a sequential format, RDX can access and read it, which saves valuable time in searching for and restoring individual files.

### Reliability

RDX has a level of reliability never before seen in a tape backup medium. The life span of a tape drive is limited by the magnetic head that is in actual contact with the tape media as it reads and writes data. This physical contact causes wear of both the head and the tape, limiting their life and ultimately resulting in failure of both drive and medium. The RDX system has no such direct contact and functions, and features a much less complex design that is inherently more reliable in its simplicity. This reliability is at least 10 times better than that of most tape drives.

The direct contact with the read and write head means that the service life of tape media is defined by the number of times tapes can be used. Whereas a high figure is sometimes specified, experts agree that, in order to ensure maximum security, an individual tape medium can only be used around 50 to 100 times. Depending on the frequency of use, this means that most tape media can be used reliably for six months to a year.

The RDX medium is a sophisticated, self-contained hard disk drive and can be connected via a USB 2.0 interface. The RDX cassette is specified to handle more than 5,000 load/unload actions. The RDX medium thus has a usage life span that is more than 50 times that of tape media.

### Affordability

The advances made in tape drives and media are well known. To take advantage of storage capacity advantages, it is necessary to purchase new tape drives and new media. However, the RDX system has no system obsolescence. RDX functions/characteristics are both backward and forward compatible.

As higher-performance cartridges are introduced each year, they will work with the existing RDX drive. This means that all RDX systems can be used with all RDX media – now and in the future. The advantage for your budget: the simplicity of the RDX design allows for a very low initial cost and a superior total cost of ownership when compared to other tape drive products.

### Backing up disk volumes with RDX

Due to the low transfer rate, users have had to resort to the typical incremental backups to date. Recovery of an entire backed-up disk volume requires the time-consuming process of going through all tape media that has been used in the backup. And if the backup catalog is faulty, the volume can only be recreated by a time-consuming search for every necessary data medium. Even with an intact catalog, finding a specific file requires a slow serial search for the correct tape cartridge and so takes a lot of time.

RDX cartridges are available in capacities of 160GB, 320GB, 500GB and 1TB (native). High storage capacity combined with the RDX drive's 90 GB/hour speed means full backups can be performed every day in less time than for incremental backups to tape.

The RDX drives automatically determine how many times a cartridge has been loaded. This saves the user from the tedious task of keeping track of how many times each cartridge has been used, especially in complex media rotation systems.

# RDX compared with today's tape technologies

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The table below gives a brief overview of how the RDX drive and cartridges surpass existing tape technologies in terms of overall cost and performance.

	RDX®	DDS Gen5	DDS Gen6
Capacity (native)	160 G, 320 GB, 500 GB, 1 TB	36 GB	80 GB
Performance (native)	25 MB/s	3 MB/s	6 MB/s
Backward and forward compatibility	Yes	No	Yes/No
EDS-protected cartridge	Yes	No	No
Cartridge status indicator	Yes	No	No
Drag-and-drop capability	Yes	No	No
Cleaning cartridge required	No	Yes	Yes
Reliability (MTBF)	550,000 hrs	125,000 hrs	125,000 hrs
Media uses	5,000	200	200
Relative price	1x	2x	3x

# Technical features and specifications

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- Backward and forward compatibility with RDX cartridges of all capacities
- USB 2.0 interface
- Two form factors:
  - 3.5-inch internal
  - 5.25-inch internal (half height)
- High-speed transfer rate for rapid backups
- High data reliability
- Ease of use
- Separate fault indicators in the form of LEDs on the cartridge and drive
- Cartridge capacities of 160GB, 320GB, 500GB and 1TB
- High-speed burst transfer rate of 480 Mbps
- Average transfer rate of 25 MB/s
- Average access times of 15 msec
- Read errors that cannot be corrected: 1 per 10<sup>14</sup> bits



# Summary

## Summary

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Before the arrival of RDX technology, users had to choose between tape, disk or a combination of both to back up their data. Now there is a new solution. users can choose RDX, the only backup alternative that offers the advantages of both technologies: tape (removability, affordability, archivability) and disks (higher performance, simplicity, reliability) – all in one cost-effective package.

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