Macarthur Stroud International

Data Protection

Removable HDD Designed for Back-up and Recovery

Selecting the best technology to meet the standards of best practice

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Executive summary

Securing information assets and business processes using data protection best practice is becoming more important to all organisations. The volume of data continues to grow and the expectation of continuous and trusted business operations underpins every business.

Businesses expose themselves unnecessarily by not ensuring that back-up and recovery routines are completed in full, in a timely fashion. Selecting the most appropriate technology will ensure that systems are protected and data is trusted and secure. Any threats from computer viruses, flood, fire or any other system failure can be addressed, reducing the organisations exposure to threats and risks.

Businesses need to use data protection best practice to secure their systems and information against system failure and computer viruses

When selecting the best solution to support the requirements of small and medium size businesses there are several factors that must be considered. These include:

❑ The technologies need to be designed for data protection. Removable hard disk drives and tapes have been designed for such environments. USB drives are designed as an extension to disk drives.

❑ The technology should support removable media. To meet the requirements of best practice, additional data copies should be located at a remote location.

❑ Forward compatibility is important so that investment can be protected

❑ Higher transfer speeds enable back-up and recovery to be completed quickly, ensuring systems can be recovered with the minimum of disruption

❑ Supporting best practice simplifies and secures the systems

❑ Cost is always a factor. This must be competitive against all options.

Technology must be designed to support best practice, including removable media, with system options that protect investment

When evaluated against traditional tape media and evolving Cloud services, removable HDDs stand out as the best option. They are designed for data protection purposes and support best practice with removable media that can be stored at a different location. They are a sound investment with forward compatibility – the docking station can support drives of different capacities and new systems offer options with up to 8 RDX bays in one system. With fast operating speeds, they can transfer large volumes of data much faster than entry level tape solutions.

Tandberg Data's RDX QuikStor and QuikStation solutions enable users to support high performance data protection processes without compromising best practice

When cost of ownership over 4 years is calculated, removable HDDs are more cost effective than tape and when best practice is included, removable HDDs are the best choice.

Introduction

Data protection is a core requirement of every business. Losing data or not being able to recover data within an appropriate timeframe can be catastrophic to every business.

Consequently, it is necessary to secure data assets from system failure so that systems can be recovered and operations continue in as short a timeframe as possible. With the changing technology landscape, there are several options to achieve this goal. However, when managing a business, best practice needs to be adopted. Taking short cuts enabled by technology may not secure the business operations.

This White Paper will address the options available to business and consider the best options in the context of best practice, especially for small and medium size organisations.

Back-up and recovery applications are critical to sound system management practices

Business issues

Information security concerns have risen to such a point that the standards, processes and guidelines have been embedded into International Standards. These tend to span different aspects of information management, for example ITIL describes how to provide and manage IT services to the business, ISO 27001 and ISO 1799 address information security in the broadest terms. All these standards feed into the need for all businesses, large and small to understand their governance responsibilities and mitigate risk.

Information security standards and guidance on best practice are included within international standards such as ITIL and ISO 27001

Technology offers many options for protecting data and recovering from a point of system failure. Examples include:
- ❑ When a disk within a disk array fails, RAID technology enables the system to rebuild the data on the failed disk.
- ❑ Magnetic tape has been an established media on which to back-up data.
- ❑ With data volumes increasing, tape has been placed under pressure as a data protection media as back-ups are directed to disk arrays.
- ❑ Using networked storage solutions to back-up data off-site to a Cloud service.

Practical solutions must be cost effective. This is one reason why tape remains attractive. The cost of ownership of a tape based solution can be appealing; however, this has to be balanced against the operational speed of disk solutions. In today's environment, the cost of ownership figures show that entry level tape solutions are no longer less costly than removable hard disk drives (R-HDD).

The cost equation has tipped to the advantage of removable HDDs over entry level tape

Best practice must assess the risk to the business and determine the way forward. Experience from establishing best practices shows that companies do not always assess the risk holistically. On top of this, the documentation and testing of processes are not completed as per the guidance set down by the company.

The result of all this is that businesses expose themselves to more risk than they appreciate through their day-to-day operational practices. How can this be reduced without taking a sledgehammer to the systems on which every business must depend?

One approach is to take one process at a time. Look at the operational considerations, assess the clear risks, select the most appropriate technology and implement the solution carefully, ensuring all who operate or interface with the systems understand the risk. With the implementation of virtualisation the need to manage all virtual machines becomes more important as the need for recovery could result from one of many different reasons.

Data protection secures business processes and protects information assets

Best practices have been set out for data protection. However, because the data protection processes are taken for granted, users often underestimate the obvious risks to which they are subjecting their business and their support systems.

Data is backed up for a reason. That reason is; in the case there is a system failure, it is possible to recover to a state that minimises the inconvenience and loss of business or time or cost resulting from the system failure.

Speed and frequency of taking back-up images will depend on business requirements. This could include frequent point-in-time copies through to a daily back-up, using disk-based technologies.

Leaving all these back-up images on the main system or within the data centre is not considered best practice. If there is a power surge that impacts system operations or a physical disaster such as flooding or fire, all the data will be in one location and risks being destroyed.

As a result, best practice emphasises taking a copy of data on a removable media and storing this in a separate location, away from the data centre and operational systems.

Computer viruses are an increasing risk to system operations. If data is left online when a virus attack is experienced, this can have a severe impact on the integrity of the data for the short and long term. If the recovery data is held on offline storage media, systems can be restored safely once the virus attack has been addressed.

System and media options

Looking at the options, we must keep in mind how portable and how resilient the system and media options are. Choices for removable media are considerable. Solutions that would be considered by small and medium size organisations include:

- ❑ Removable HDD, ideal for fast back-up and recovery, replacing entry level tape
- ❑ USB disk drives, designed to extend disk capacity on systems
- ❑ Entry level tape, such as DAT and Travan (LTO is seen as an enterprise class technology)
- ❑ Cloud Services, enabling files and data to be transmitted via a network to a different location
- ❑ Other technologies:
  - ➢ USB sticks and solid state memory
  - ➢ CD / DVD, ideal for distributing software or data.

Choices in technology must keep in mind how portable and resilient the system and media options are

Removable hard disk drives

Removable hard disk drives have similar capacity points to other disk based solutions – they all harness the available disk drive technology. However, they benefit from several key features:

- ❑ Transfer rates are faster using traditional high performance disk interfaces such as SATA and USB
- ❑ They have all the characteristics of random access to disks which means that files can be directly accessed and when capacity limits are identified, the disk can be replaced. The system asks for another drive unit and writing continues, this is known as media spanning.

Removable HDDs offer faster back-ups than tape and expansion capabilities from a single docking station to multiple docking stations, all supporting disk capacities from 160GB to 1TB

Standardised drive units can be used to provide regular data protection copies (daily, once a week or once a month, for example). Because the disks can be removed and stored at another location, with a ruggedized design to meet with physical handling requirements, this option meets all the requirements of data protection best practice and is an economic solution.

Removable disk solutions can be extended to support multiple drives, offering more options with ease of operation as well as allied with new technologies such as data

deduplication which extends the life of lower capacity drives while supporting the high data growth rates experienced by all organisations.

Comparing Tandberg Data Removable RDX drives and USB Disk Drives

RDX	USB Disk Drives	RDX Advantage
Expandable	No	Ability to add cartridges and dynamically increase capacity
Portable	No	Cartridges are designed to be portable for offsite storage & archive
Media Spanning	No	Enables data transfers that are larger than a single cartridge or disk device
Internal SATA & USB	No	RDX can be integrated into systems for easier handling
550,000 hours MTBF	375,000 hours MTBF	Higher reliability – Longer life
Drop - 39" to hard surface	No	Cartridge durability translates into longer life and reliability
Static Resistance	No	Eliminates server failures due to statically charged peripheral
System Integration	No	Vibration resistance means better performance when operating on multi-disk, multi-fan servers

Tandberg Data removable RDX technology supports best practice and growth opportunities unlike USB Disk Drives

USB disk drive

USB drives are designed to extend disk capacity and not for data back-up. Capacities track available disk technology and are available with USB connection.

There is an increased chance of data failure without the ability to support spanning of files across disk drives. Users have to know they have ample additional capacity for incremental and weekly/monthly full back-ups. This creates an additional task to ensure that there is enough capacity. The risk of back-ups not being completed increases, creating a real problem if systems have to be restored.

USB drives are designed to extend disk capacity and are normally left attached to the computer

USB disk drives are normally left attached to the computer making organisation's data assets vulnerable to virus attacks. They are not ruggedized and therefore are subject to failure when transported. If they are to be transported, the whole unit, with the power cable, will need to be packed for transported.

While good for extending disk capacity, USB disk drives do not support best practice for data protection.

Tape drives

Tape has been a traditional technology for back-up and recovery. The challenge is that tape drive and tape transfer speeds are relatively slow. This leads to elongated back-up times as data capacities grow; for example 25GB of data will take almost 1½ hours to back-up with a DAT160 drive compared with less than 25 minutes with a removable hard disk solution. As data capacities are often in excess of 200GB it is easy to see why back-ups may not be completed in a timely fashion, or worse not complete at all, leaving the business at risk.

While enterprise tape solutions are faster, the cost is also higher. The subject of this paper is to consider the relevance of entry level tape solutions for small and medium size businesses. These businesses will have been using DAT and Travan tape solutions for a number of years. The technology lifecycle is making these technologies less attractive. For recovery, the complete tape needs to be replayed, selective files or back-up images cannot be easily selected.

In addition, the heads on the tape drives need to be cleaned by running a tape cleaner every few months.
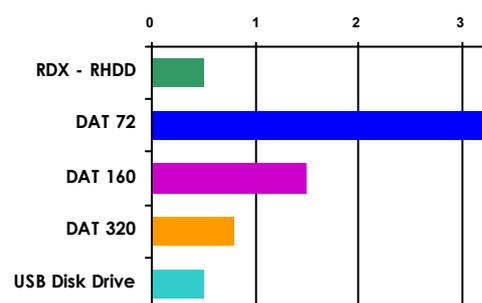
However, tape does support aspects of best practice. Once the tapes have been written, they can be taken off-site easily and recycled within the data protection processes.

The role of tape is changing. With the access and retrieval speeds being much slower than disk, tape is good for archive data which will not be accessed frequently, but must be retained for 5, 7, 10 years or more.

Hours to complete daily back-up - one drive – 25GB

Hours to complete weekly back-up - one drive – 500GB
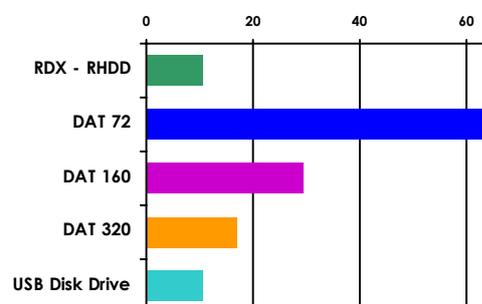

Cloud services

Vendors have been offering managed and outsourced data protection services whereby users can transmit their back-up data to a third party site on-line. This is now being named under the heading of Cloud Services. As communication costs and speeds increase, this is becoming a more attractive option. Compared with an on-site disk based back-up service, communication speeds are still relatively slow, unless companies are willing to pay for the highest speed services.

Example of Communication Services Supporting Cloud based Data Protection

Service Type	Rated Transfer Speed Mbps	GB/hr Transferred	Hours for 40GB	Hours for 100GB
T1 (DS1)	1.5	0.68	67	150
T3 (DS3)	6	2.70	17	37
T3 or OC-3	45	20.25	2.5	5

Assuming the communication link achieves a 75% rated service level

T1 (DS1)	1.5	0.51	80	200
T3 (DS3)	6	2.03	20	49
T3 or OC-3	45	15.19	2.7	7

Communication speeds are important when assessing the relevance of Cloud services

With a rated service of 1.5 Mbps, 40GB of data will take 67 hours to transmit, that is almost 2½ days of continuous transmission! With a faster 45 Mbps, it will take 2½ hours. There is a cost associated with this! T1 services cost from $300-$1,000 per month, T3 services cost from $2,000 and $5,000 per month. In addition, there will be data storage costs to include.

This supports best practice with regards to the data being retained off-site, but there is an additional challenge; when recovering systems from these Cloud Services, it will take at least the same time if not longer to recover systems.

Full system recovery from Cloud services must be considered as well as incremental and full back-ups

Other media types

There are other options that can be considered.

- ❑ CD / DVD media has been used for back-up. This is suitable for small volumes.
    - ➢ It is necessary to ensure that the media types are rewritable; otherwise there is a new media unit for each back-up.
    - ➢ Media spanning is not available.
    - ➢ This media is more suitable for archive copies of data or distribution of software and data.

- ❑ Solid state memory is becoming more pervasive.
    - ➢ In the form of USB sticks, this is attractive for transporting file copies. Using these for back-up of volumes of over 1GB is stretching the appropriate use of this technology. Labelling and tracking these sticks can be a challenge, exposing a business to unnecessary risks.

> ➤ Higher capacity solid state drives are now available and can be used as an alternative to disk or main memory. These operate faster than hard disk drives. Cost is currently an issue. As the technology develops, this will become a viable option to disk based solutions within the next 3-5 years.

Best practice positioning

When evaluating the alternative technologies for back-up and recovery, the following table provides a relative assessment of each technology.

Technology Positioning

	Designed for DP	Removable Media	Forward Compati-bility	Transfer Speed	Supports Best Practice	Overall
Removable HDD	●●●	●●●	●●●	●●●	●●●	✓✓✓
USB Disk	●●	●	●	●●●	●	✓
Tape	●●●	●●●	●●	●●	●●●	✓✓
Cloud	●●●	●●●	●●●	●	●●●	✓✓
Other	●	●●	●●	●●●	●●●	✓

Key		Key	Overall
●●●	Very Good	✓✓✓	Best
●●	Good	✓✓	Option
●	OK	✓	Not appropriate

When evaluating alternative technologies, the following must be considered:
- *Is the technology designed for data protection?*
- *Does the technology support removable media?*
- *Is the solution forward compatible?*
- *Does it support best practice?*
- *Cost of ownership*

Removable HDDs demonstrate their relevance against alternative technologies. Because they are designed for data protection purposes, they support best practice with removable media that can be stored at a different location to the systems. They are a sound investment with forward compatibility – the docking station can support drives of different capacities. And with operating speeds they can transfer large volumes of data ensuring back-ups are completed in a timely fashion, reducing risk to the business.

Removable HDDs demonstrate their strengths against alternative technologies

Tape loses out to removable HDDs because of forward compatibility of systems and transfer rates. Media tracking and handling will entail between 3 and 9 times as many media units as removable HDDs.

Cloud services are also relatively slow and therefore not fully appropriate unless high speed networks are available for larger volumes of data.
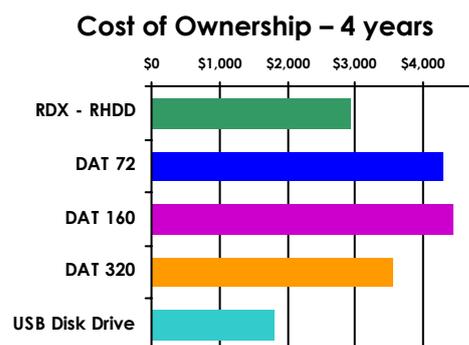
Other technologies, such as USB disk drives, are not designed for data protection purposes and therefore fall short on aspects of transportability and handling back-up files that need to span across two disks.

Assessing the cost options

Cost of ownership is a key factor in every decision. As users consider removable HDD, USB disk drives and migration from existing entry level tape solutions, these alternatives are being compared. Cloud services have been excluded in this example because the incremental cost to upgrade the communication lines would need to be considered. This would take the total cost of ownership equation beyond what is reasonable for small and medium organisations.

When addressing total cost of ownership, the following parameters have been considered:

❑ Acquisition cost of the docking station, drives, media and tape cleaning media

❑ Daily incremental back-up of 25GB and weekly full back-up of 500GB, with data storage growing at 30% per annum

❑ 4 year lifecycle of costs

❑ Best practice, so that where only one docking station or drive may be required from the figures, there will be an additional docking station or drive available in case of failure

❑ USB disk drives do not follow the same model because they do not meet the requirements of best practice. However, the profile allows for an additional disk for each back-up session in case of failure.

Cost of Ownership – 4 years

	$0	$1,000	$2,000	$3,000	$4,000
RDX - RHDD					
DAT 72					
DAT 160					
DAT 320					
USB Disk Drive					

When the costs are balanced with best practices of data protection, removable HDDs are the best choice.

❑ The cost of USB disk drives may look attractive, but they are not designed for data protection purposes

❑ Entry level DAT tape drives are now being overtaken by removable HDDs from a cost and performance perspective.

When costs and best practices of back-up and recovery are considered, removable HDDs are the best choice

Looking forward

This paper demonstrates that removable HDDs are the best option for small and medium businesses when addressing their data protection requirements. But what

life is there in the technology – a fair question when looking to the future and investment protection?

These solutions are designed to support PC and server environments for small and medium businesses. The options start with a single docking station that can support a range of disk capacities from 160GB to 1TB. These capacities match the available disk technology developments.

Tandberg Data has taken this technology further with the RDX QuikStation which supports up to 8 docking stations for users with more demanding data protection requirements. This is relevant in the world where virtualisation is an increasing component of the system platforms. Maintaining back-up images and being able to retrieve these quickly can only be achieved with disk based solutions. When allied to removable HDD technology, the data protection subsystem is designed for best practice data protection, offering organisations the flexibility required to match their operating environments.

Tandberg Data's RDX QuikStor and QuikStation solutions enable users to support high performance data protection processes and meet the demands of best practice

To these hardware platforms, Tandberg Data has included its data protection software supporting data deduplication and data replication between different locations amongst other key features.

Tandberg Data's RDX QuikStor and QuikStation solutions are designed for growth, supporting new forms of automation and deduplication

Tandberg Data's RDX QuikStor and QuikStation range of data protection platforms are an ideal solution for organisations who have grown out of tape and who are looking to ensure that their data protection practices are sound, meet with best practice and secure the trusted information assets of an organisation.