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The Best Replacement for DDS Continues to be DDS

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“The low-end tape drive market will continue to be the highest volume market through 2006. Despite new product offerings, DDS tape technology will continue to be the most prevalent tape technology in the low-end segment in the near term.”

Source: Industry analyst firm IDC in its Worldwide Tape Drive Forecast and Analysis, 2001–2006 report (document #: 28304)

Digital Data Storage (DDS) is the tape technology of choice for a growing business’ data protection needs. Products based on this technology, DDS tape drives, also known as DAT (Digital Audio Tape) drives, have the largest installed base. In CY2001, Gartner/Dataquest reported that DDS products represented over 51% of the installed base.¹ And, the demand for DDS tape drives continues to be brisk. Drive shipments CY2001 were 53% of the market² and through CQ2’02 demand hardly changed.³

The forecast through 2005 is for DDS tape drives to sell in greater quantities than drives based on other technologies.⁴ Yet, tape drive buyers are being flooded with negative statements on DDS by companies offering products based on alternative technologies that are proprietary and have yet to achieve OEM adoption. For example, Sony’s web site recently stated the following: “Outgrown DDS? For DDS replacement or migration, step-up to new AIT-based tape solutions.” In an Exabyte press release dated April 8, 2002, the company stated that it “...believes VXA products are the ideal replacement for DDS technology because they are recognized for their proven reliability and provide capacities that exceed DDS requirements”. Furthermore, the OnStream web site recently said: “... [ADR2] offers DDS-3 and DDS-4 users an unmatched opportunity to migrate to the new standard in data protection at a very attractive cost. DDS is dead, but ADR2 has a long life and healthy product roadmap ahead”.

Purpose

This paper will propose why products based on DDS technology have been successful and why this trend is expected to continue, despite fear, uncertainty and doubt being generated by manufacturers of proprietary competing formats. We’ll explore competitive alternatives to DDS in the most popular tape drive product segment, described as “low-end” by IDC⁵. Shipments in this segment were 60% of the tape market in CY2001 and will grow to 66% of the market in

¹ Gartner/Dataquest May 2001

² Market is defined as drives based on these tape technologies: Travan, DDS, SLR, ADR, 8mm, AIT, DLT, LTO and high end tape (e.g. Magstar)

³ IDC November 2002

⁴ Gartner/Dataquest May 2001

⁵ Low-end drives are able to store 10-50GB of native, uncompressed data storage capacity per cartridge.



CY2006.⁶ Tape products considered a part of this segment are economical and attached directly to servers and workstations as opposed to being included in automated tape libraries which back up multiple servers. We'll focus on VXA (Exabyte), ADR (OnStream) and AIT (Sony) technologies, which are positioned as DDS replacements.

Buyer's Guide to Tape Technology

Tape Technology Buyer's Guide

- √ **Large capacity/scalable**
- √ **Backward- compatible**
- √ **Low cost of ownership**
- √ **Vendor viability**
- √ **Vendor support**
- √ **Vendor commitment**
- √ **Open format**
- √ **OEM acceptance**

To understand why DDS technology will continue its success, we should understand what makes a user choose a tape drive product. First, the tape technology must grow with storage needs. Data storage is growing exponentially in companies today, with e-mail, e-business, databases and other storage-intensive applications contributing to this condition. Therefore, users need a tape drive that has the capacity for current need with scalability to allow for expanding data storage. So an ideal tape technology must provide large data storage capacity per cartridge and also be supported by a scalable, automated tape device such as an autoloader. An autoloader has a single tape drive and a rotating magazine that can store multiple cartridges. When

data storage grows, a user can add more cartridges rather than more tape drives – a more costly alternative.

Another important factor is compatibility of a new generation of the technology with previous generations of the technology, often referred to as “backward-compatibility”. The reason backward-compatibility is important is that a user often reads or writes data to a cartridge that was created from a previous generation tape product. If the tape drive's technology lacks backward- compatibility, the new drive will not be able to accomplish this task rendering the cartridges the user has useless with the new drive. Therefore, having backward-compatibility protects the user's investment in the technology. If a user has multiple tape drives based on a technology, this becomes even more important.

Other factors to consider when buying tape technology is the “cost of ownership” (cost of data cartridges and cleaning cartridges), a vendor's financial viability (will they exist for customers in the future), vendor support (such as quick replacement of defective product), the vendor's commitment to the technology (commitment to future generations of the product), ability to

⁶ IDC November 2002



source like product from multiple vendors (“open format” technology) and an assurance that there is demand for the product (acceptance by major system OEMs⁷ and market share).

Why DDS Is Successful

DDS technology has a proven track record, one that spans more than 13 years. The first DDS-1 tape drive with a 1.3GB native capacity was introduced in 1989. Since then, five generations of the product have been released (DDS-1, -DC, -2, -3, -4). With each new generation, the amount of data that can be stored on one cartridge has either doubled or nearly doubled. Also, most of the DDS generations have been introduced in autoloaders where users add storage without adding more drives. Compatibility with previous generations has crossed two or more generations so users get investment protection in the technology. And, tape drive performance, measured in data transfer rates, has increased with nearly every new generation so with shrinking backup windows users can complete their data protection tasks faster.

In a press release dated January 20, 2003, Seagate RSS and HP announced the development of DDS 5th generation technology. Both companies are expected to release drive products based on this technology that will have a native capacity per cartridge of 36GB (72GB compressed) and a native data transfer rate of a minimum 3MB per second. Autoloader products are also expected to be announced that will push drive storage capacity up to 480GB and beyond. And, DDS 5th generation products will have economical media/accessories just like their predecessors and be read/write compatible back two generations to DDS-3.

DDS technology continues to be an “open format” or product manufactured by multiple vendors and is living up to its promise of providing users with an increasing storage capacity, backward compatibility, investment protection and low cost of ownership. These are the reasons that DDS is the winner and will continue to win in the tape market for years to come.

Fear Factor

In blatant disregard to the superiority of DDS technology, the size of the DDS installation base, and the viability of DDS manufacturers, some manufacturers are encouraging DDS tape drive buyers to choose tape technologies with greater risk. Ecrix, the company that developed VXA tape technology is a good example. After Ecrix was purchased by Exabyte, Exabyte offered VXA tape drive products along with Exabyte’s midrange Mammoth 8mm tape technology products. Combining Ecrix’s market share with that of Exabyte, Exabyte’s new market share is 1.9% of the total tape market.⁸ Exabyte stock is trading at 66 cents⁹, the company is losing

⁷ Defined as IBM, Dell, HP and SUN

⁸ CQ2’02 shipments: IDC November 2002

⁹ As of December 6, 2002



money and a recent SEC filing revealed that it only has enough cash to sustain the business until December 2002.¹⁰ Only one major system OEM has qualified VXA and is selling the product as a part of a tape storage portfolio. Finally, Exabyte offers minimal support and requires users to purchase an advanced replacement warranty.

OnStream is another company trying to instill fear in DDS buyers. OnStream developed ADR technology and declared bankruptcy in March 2001 leaving users with no support. It then sold its intellectual property to OnStream NV based in the Netherlands. End-users who bought drives sold by the original company can obtain a warranty contract but must pay a service fee. No other company manufactures drives based on ADR technology and no major system OEM has qualified the product to be a part of their tape storage portfolio. OnStream's unit share of the CQ2'02 tape market was 2.8%, which declined from 3.1% they held at the end of 2001.¹¹ And, their support is minimal since they do not offer to replace defective units before it is returned to OnStream. Advanced replacement programs, offered by Seagate and others, provide replacement units before defective units are received by the manufacturer.

High Risk and Low Acceptance

Users must perceive risk in buying these products as illustrated by an inability of these companies to attain or grow sizable market share. Neither of the companies have been able to seize a major share of the tape market and, in fact, their market shares declined from CY2001 through mid-2002.¹² Based on the following IDC tape market forecast statement, you could assume that these companies may not exist in their present form in the future: "IDC's long-term outlook calls for more pressure on tape drive suppliers. We anticipate more vendor consolidation through the forecast period." Due to the low acceptance rate for VXA and ADR products, and their lack of traction in the market, the rest of the paper will focus on Sony's Advanced Intelligent Tape (AIT) technology.

AIT Woes

Sony intentionally wants to move DDS buyers to its AIT products and, by stating in a company press release that no new DDS generations would be developed¹³, Sony wished to encourage that transition. Sony feels that AIT's "proven market acceptance and future scalability, offers an ideal

¹⁰ Exabyte 10-Q, November 12, 2002

¹¹ IDC November 2002

¹² IDC November 2002

¹³ Sony press release dated April 18, 2001



transition from DDS...".¹⁴ In an apparent effort to force a shift from DDS to AIT, Sony also reduced AIT pricing to levels below that of the DDS products.¹⁵ The bottom line is that it is less costly to Sony to commit to one product line (AIT) and it's financially beneficial. Expenses associated with building, selling and supporting an additional product line is higher. And, Sony owns 100% of the rights to AIT.

Yet, tape buyers feel that DDS meets their needs. In CY2001, the DDS installed base was 11 times larger than AIT's.¹⁶ Only one major system OEM has qualified AIT products and is selling the product as a part of their tape storage portfolio. Despite Sony's 18-month old goal of replacing DDS with AIT, Sony still sells DDS products for one simple reason - because the market does not require an alternative to DDS.

Beware of the Price Trap

Sony AIT drives cost less than DDS drives, but in looking at total cost of ownership, does the same claim hold? In some cases, the AIT drive mechanism may be priced lower but the total cost of ownership of a tape drive is affected by the cost of accessories such as data and cleaning cartridges. And the demand for these accessories is fueled by a user's tape rotation strategies, the expected life of the cartridge and the drive's operational environment. Companies may buy several data cartridges to do daily, weekly, monthly, quarterly or more regular backups depending on the value of the data. According to the DDS Manufacturer's web site, about 2000 passes can occur before performance degradation, a backup session will cause about six passes, and based on how often the tape is used, you may need to replace the cartridge frequently. Plus, heat, dust and other environmental factors can affect the performance of the drive so using cleaning cartridges provides extends the life of the drive and media, while ensuring that the data is stored and restored properly. The more these factors come into play, the greater the need for data and cleaning cartridges.

An AIT drive's cost of ownership is actually greater than a DDS drive because AIT accessories cost substantially more than similar DDS products. For example, Sony's 40GB DDS-4 data cartridge costs \$18.51 vs. \$63.86 for a 50GB AIT cartridge, If you calculate the cost per GB, the AIT cartridge is 176% more expensive than the DDS cartridge. Furthermore, an AIT cleaning cartridge costs more than DDS. An AIT cleaning cartridge costs \$31.85 vs. \$14.31 for a DDS cleaning cartridge.¹⁷ If you calculate the cost per GB, AIT is 78% higher than DDS. The more AIT accessories you need, the more you save with DDS technology. If you needed to regularly

¹⁴ Sony press release dated April 18, 2001

¹⁵ CDW pricing November 2002

¹⁶ Gartner/Dataquest May 2002

¹⁷ All costs in this section is based on CDW web site pricing as of November 2002



back up 30 GB of data, your yearly consumption of data and cleaning cartridges could be 15 and 2, respectively. Based on a cost per GB, you would enjoy a per drive annual savings of over \$383 per drive by choosing DDS technology over AIT technology.¹⁸

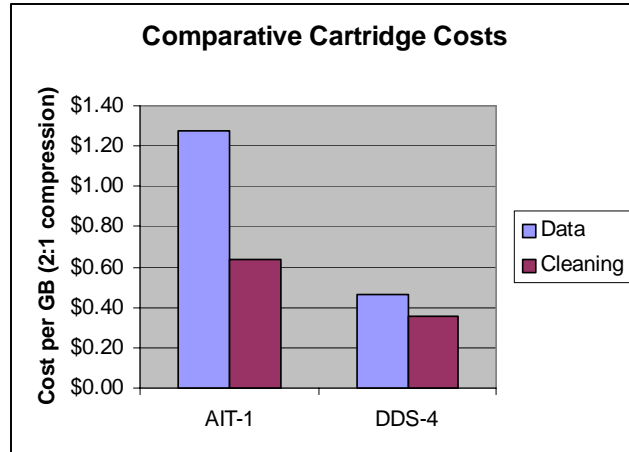
An Open Format Tape Technology Benefits the Market

The DDS Manufacturer's Group was created to develop and promote products based on DDS specifications. This group allows multiple manufacturers access to the specification to design and build drives based on the DDS specification, thereby creating an "open" format. They are also responsible for ensuring that all DDS products by multiple manufacturers are interchangeable. This allows for data to be recorded on one manufacturer's drive and read from another manufacturer's drive. Testing is done to ensure that drives that carry the logo meet the standard.

There are many benefits of an open format tape technology. First, there are multiple sources of supply so if a user cannot buy a drive from one manufacturer they can buy one from another. Second, users obtain competitive pricing and a robust feature set in the products they buy because multiple manufacturers are competing for their business. And, users are assured that there is compatibility with previous generations and interchangeability between different vendor's products. DDS products enjoy this benefit, AIT does not. Sony is the sole owner and manufacturer of products based on AIT technology. Drive pricing is controlled by Sony, Sony is responsible for product supply and Sony makes all decisions related to compatibility.

The Importance of Backward-Compatibility

Past generations of DDS drives have offered backward-compatibility and future generations are expected to offer it. The DDS Manufacturers Group is responsible for developing specifications for future products so that they have backward-compatibility. DDS drive manufacturers understand the benefits of this characteristic. One is investment protection. Users are comfortable



¹⁸ Based on cost per GB, DDS-4 data and cleaning cartridges are \$0.81 and \$0.28 less than like AIT-1 accessories. If you multiply each by 30 (30GB), the total savings is \$24.43 for data and \$8.38 for cleaning. To estimate annual savings take the total for data and multiply it by 15 cartridges (\$366.50) and the total for cleaning and multiply it by 2 (\$16.76) and the result is \$383.26.



knowing that they will be able to utilize the media cartridges from previous generations in which they have they've invested. This provides users with a natural upgrade path that does not require additional investment, benefiting both legacy DDS users and new DDS users.

AIT technology may or may not have backward-compatibility. Sony is the sole manufacturer of AIT technology so Sony makes all decisions related to the specification for AIT drives and their compatibility. Users will not get the same assurances from AIT and if recent history is any indication, users may not get the investment protection they need. Sony announced a version of AIT, called "S-AIT" that is not backward-compatible with earlier generations of AIT.

Choosing the Best DDS Partner

With DDS tape technology being the right decision to make, the next decision is which DDS partner to choose. DDS products are manufactured by Seagate, HP and Sony. Seagate is a storage leader that is #1 in worldwide tape drive shipments for 2001 with 29.4% share of the 2.5 million unit market.¹⁹ Seagate has shipped over 10 million tape drives and is expanding its leadership position. According to IDC, in a slightly different report Seagate was #1 in CY2001 with 28.3% share and it grew its share in CQ2'02 to 31.4%.²⁰ With its recent announcement regarding DDS 5th generation, Seagate has proven that it is committed to DDS technology. Seagate DDS products are tested and configured at every major system OEM. The company is the only independent tape drive manufacturer solely dedicated to tape products.

Seagate DDS products offer these unique features and benefits:

- Highest reliability among DDS-class drives
- Environmentally Sealed Chamber for Head-to-tape interface increases reliability by decreasing airborne contaminants, increases data integrity and decreases wear
- Sapphire Cleaning Blade increases reliability by decreasing media contaminants.

And, Seagate DDS products have read and write compatibility with two or more previous generations and a Rapid Replacement program included for three years of the warranty period where a defective unit will be replaced before it is received by Seagate.

Conclusion

¹⁹ Gartner/Dataquest May 2002

²⁰ IDC November 2002



Buyers are choosing DDS over AIT and other technologies because DDS presents less of a risk to the market. The market understands that data protection cannot be a risky proposition, so it continues to trust the reliability of DDS and viability of its manufacturers. With DDS, you get the capacity you need now and in the future, low cost of ownership, the benefits of an open tape format and investment protection through backward-compatibility. And, DDS's dominance is expected to continue. As IDC stated, "despite new product offerings, DDS tape technology will continue to be the most prevalent tape technology in the low-end segment in the near term".²¹ Gartner/Dataquest agrees with this statement since they forecast that in 2004, DDS drive shipments will still exceed AIT drive shipments by a factor of 6.3 to 1.²² The only other decision is to choose the right DDS partner. Seagate RSS offers the most reliable DDS drive on the market and it is the tape market leader with a strong commitment to DDS technology and the support to meet user needs. ♦

For more information on the company and its products, go to:
<http://www.certance.com>.

²¹ IDC November 2002

²² Gartner/Dataquest May 2002