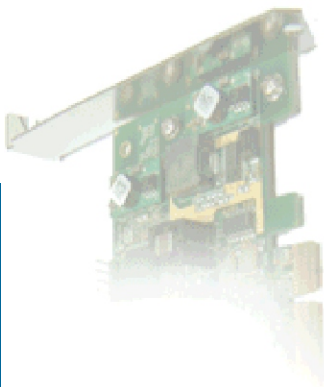


# SC MX4E



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## Introduction

Continuing explosion of enterprise data, combined with shrinking backup windows, is putting substantial pressure on existing tape based backup methods. In response, many IT departments are deploying Virtual Tape Libraries or other disk based backup methods. In addition to increasing the raw throughput, these systems also simplify the system administrator's life by greatly improving recovery times and eliminating the need for complex features like tape multiplexing.

However, these benefits come at a price. Despite sharp drops in

disk prices, the cost of disk based backup system remains higher than tape-based systems with comparable capacity. Virtually all tape drives use hardware based compression to increase capacity and speed, while most VTL systems to date have only offered software based compression. Unfortunately, throughput reduction from software compression is unacceptably large, hence it is rarely used. StorCompress MX4e addresses this performance gap with high performance hardware compression that OEM customers can readily integrate into their VTL systems with minimal effort.

## Best-in-class Compression Ratio

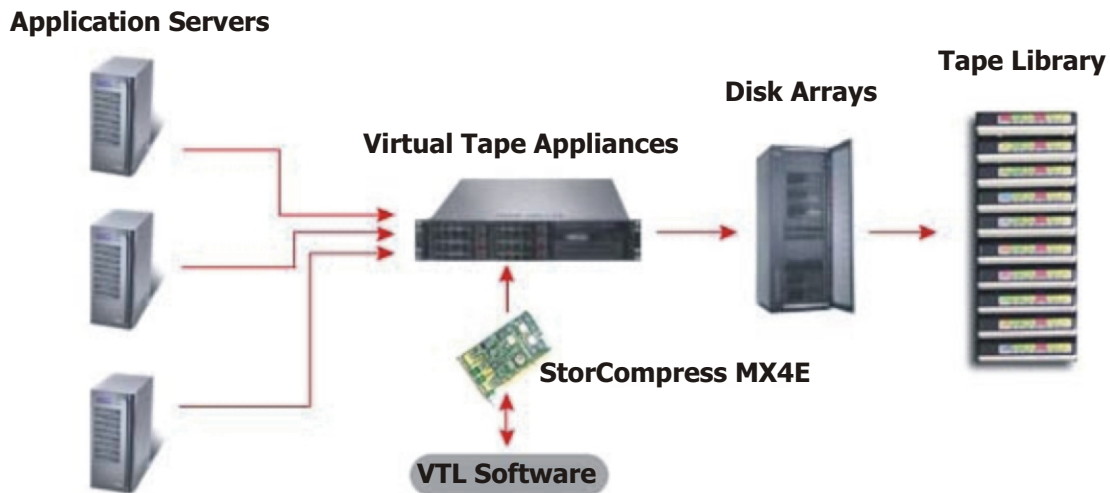
StorCompress MX4e implements the "deflate" compression algorithm in purpose built hardware. Compared to older hardware compression technologies, this yields better compression ratios. It is also substantially better than LZO software compression that is used in a variety of VTL systems. The table below shows that StorCompress MX4e results in 25% better utilization of disk space than LZO compression. This leads to the best possible cost per GB. StorCompress MX4e works on PCI-e form factor thus could be easily integrated with the latest standard servers.

## Leading Edge Performance

With 4 independent compression engines operating in parallel, StorCompress MX4e offers throughput of 500 MB/s for compression. This is achieved with recently developed SuperCompress technology, which yields better performance with fewer engines. This performance level is well matched to dual 2 Gbps FibreChannel interfaces or a single 4Gbps FibreChannel interface. Multiple StorCompress MX4e cards can be used in a single system for even higher performance.

	LZO			StorCompress MX4e		
	Original	Compressed	Ratio	Compressed	Ratio	LZO larger by (%)
HTML	7659520	3183627	2.406	2531273	3.025	25.77%

**Note:** For compressed size, smaller is better, with compression ratio, larger is better.



**Figure1 : Virtual Tape Library**

The figure above illustrates a common application for StorCompress MX4e. The data from a number of application servers and other backup clients is transferred to the Virtual Tape Library (VTL) Appliance during backup. The VTL software on the appliance submits the data to StorCompress MX4e for compression. The compressed data is written to the disk array, leading to better capacity utilization and improved performance. Often, VTL appliances are used in a disk-to-disk-to-tape (D2D2T) environment. The virtual tapes created in the appliance are then exported to physical tapes for off-site storage. In that case, the VTL software could choose to decompress the data using StorCompress MX4e, which ensures that the physical tape is readable in any system. In that case, the tape drive will likely re-compress the data as it is written to tape. However, users are increasingly choosing to encrypt the data before sending it off-site. Since encrypted data looks like random text, it is not compressible by the tape drive. In such situations, the VTL software keeps the data in compressed form and encrypts it and writes it to tape. During recovery, the VTL software decrypts the data and then uses StorCompress MX4e to decompress it. The recovered data is then sent to the client requiring the restore operation.

StorCompress MX4e is a low profile PCI express based card in the StorCompress line of products. The SC MX4e contains a PCIe-to-PCIX bridge and two PCI-X based StorCompress 300 designs on the secondary bus. This contains a total of four compression engines.

## StorCompress MX4E Features and Benefits

Feature	Benefit
500 MB/s throughput	Addresses needs of high-performance FibreChannel based VTL systems
4 Compression engines	Performance increases for compression
"Deflate" compression algorithm	Compatible with open source gzip/zlib software Guarantees data will be decompressible by the gzip software running on the host system
Kernel Level API	Integrates well with VTL software written at kernel level
Decompression	Enables fast recovery of data
Multiple data streams	Allows simultaneous backup of all servers
CRC32/Adler32 Checksums	Protects against data corruption
Error Checking	Ensures graceful handling of data corrupted during transmission
Anti-expansion algorithm	Compression is not applied if its use would cause data to expand Guarantees 1:1 compression ratio with incompressible data Facilitates higher throughput for uncompressible data
Parity error checking	Enables the host system to discard the data instead of allowing the error to propagate
Standard PCI-E form factor	Easily plugs into industry standard servers

## Applications

- Virtual Tape Libraries
- Compression of streaming data
- Compression of in-memory databases in low latency applications

## Technical Specifications

Specifications	StorCompress MX4e
Compression Algorithm	"Deflate" used in gzip/zlib
Performance	<p><b>Compression:</b></p> <p>Calgary Corpus      494.186 Mbyte/s</p> <p>Canterbury Corpus    505.78 Mbyte/s</p> <p><b>Decompression:</b></p> <p>Calgary Corpus      374.727 Mbyte/s</p> <p>Canterbury Corpus    387.818 Mbyte/s</p> <p>(aggregate, for four compression engines)</p>
Operating System Support	<p><b>Kernels supported:</b></p> <p>Linux 2.4</p> <p>Linux 2.6, 32 or 64 bit</p> <p><b>Specific distributions tested:</b></p> <p>Fedora core 1, 2, 3, 4</p> <p>Linux Redhat 7.2, 9</p>
Power Consumption	<p>+3.3V: 1800 mA (Typ)/2.6 A (Max)</p> <p>1.5V: 1.3A (Typ)/1.5 A (Max)</p> <p>(estimated)</p>
Bus Type	PCI Express 1.1 compliant (x4)
Humidity Range	5% - 85 % (non-condensing)
Operating environment	Ambient Temperature: 5-45°C.
Dimensions	<p>Form Factor: Low Profile card</p> <p>Length: 167.65</p> <p>Height: 69.9</p>

Note: Above dimensions are for the PCB only and do not include the mounting bracket  
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