IBM System Storage TS1130 Tape Drive Models E06 and other features enhance performance and capacity

At a glance

With its higher performance and greater capacity as compared to the TS1120 Tape Drive Model E05, the use of the TS1130 Tape Drive can help save costs as you reduce your number of tape drives and cartridges, and associated floor space. Enhancements of the TS1130 Tape Drive:

- Native data rate performance of up to 160 MB/sec versus the 100 MB/sec data rate of the TS1120 Tape Drive Model E05.
- With the use of the IBM 3592 Extended Data cartridge (JB), the TS1130 Tape Drive can format a cartridge uncompressed of up to 1 TB (3 TB with 3:1 compression)
- High reliability of the 3592 drive and media maintained, and improved with added features:
  - Giant Magneto Resistive (GMR) head technology introduced for the first time
  - Head overcoat technology into tape, introduced for the first time, offering improved head protection and wear characteristics
  - Improved standby power management that automatically reduces fan speed when idle to lower power dissipation and reduce the risk of unnecessary airborne debris contamination over extended idle periods
- Encryption capabilities designed to work with the Encryption Key Manager component. Encryption management methods supported include System, Application, and Library Managed.
- Small form factor to help improve space efficiency of your tape infrastructure.
- Dual-ported native switched fabric interface designed to enhance the attachment flexibility.
- High reliability and availability design.

Overview

The IBM System Storage™ TS1130 Tape Drive, Models E06 and EU6 (machine type 3592) are the third generation of IBM's highly successful 3592 Enterprise Tape Drives. The TS1130 Tape Drive is supported for integration in the IBM System Storage TS1120 Tape Controller Model C06, IBM Enterprise Tape Controller 3592 Model J70, IBM System Storage TS3400 Tape Library, IBM System Storage TS3500 Tape Library, IBM TotalStorage® 3494 Tape Library, and IBM Silo Compatible Tape Drive Frame 3592 Model C20, or racks that enable stand-alone installations.

Note: The TS1130 3592 Model EU6 is only available as an upgrade to the TS1120 3592 Model E05 Tape Drive. Through this change, the E05
canister is upgraded to include the components necessary to achieve the media capacity and performance points of the EO6 tape drive through the Miscellaneous Equipment Specification (MES) process. Model upgrades beyond the Model EU6 will not be available. IBM’s plans are subject to change without notice, and IBM does not warrant that future upgrades will be offered for the Model E06. In addition, IBM’s standard warranty terms will apply because Model EU6 is only available as an MES to Model E05. Model EU6 will assume only any remaining warranty entitlements or the service status of Model E05 that has been upgraded.

The TS1130 Tape Drive is designed to provide higher levels of performance, reliability, and cartridge capacity than the TS1120 Model E05 Tape Drive. It has a high-technology Giant Magneto Resistive (GMR) head design and provides a native data rate performance of up to 160 MB/sec versus the 100 MB/sec data rate of the TS1120 Tape Drive Model E05. The TS1130 E06 Tape Drive has a dual-port 4-Gbps Fibre Channel interface for Fibre Channel attachment to host systems or a switched fabric environment.

With the use of the IBM 3592 Extended Data cartridge (JB), the TS1130 Model E06 can format a cartridge uncompressed up to 1 TB (3 TB with 3:1 compression). The TS1130 E06 is designed for automation and uses a tape cartridge with a form factor similar to the 3590 tape cartridges, which allows it to be used in the IBM TS3400, TS3500, or 3494 Tape Libraries.

The TS1130 Tape Drive also supports drive-based data encryption to help protect your data. The TS1130-based encryption and associated Encryption Key Manager component are supported in a wide variety of operating system environments including IBM System z™ (z/OS®, z/VM® (guest support-only), and z/VSE®), IBM System i™, IBM System x™, IBM System p™, HP-UX, Sun, Linux™, and Windows®. Three encryption management methods are supported: Application, System, or Library Managed. The encryption capability is supported when the TS1130 Tape Drive is integrated or attaches to the IBM supported tape libraries, subsystems, or controllers.

**Note:** Release 2.1 of the Encryption Key Manager is the minimum supported release level with the TS1130 Tape Drive. For the latest version of the Encryption Key Manager, refer to http://www.ibm.com/support/docview.wss?&uid=ssg1S4000504

**Key prerequisites**

The TS1130 Tape Drive Model E06 is supported in a wide range of environments including selected IBM Power Systems, IBM System i, IBM System p, IBM System x, and other servers running AIX®, HP-UX, Linux, Sun Solaris SPARC, and Microsoft® Windows operating system environments. Support for IBM System z (z/OS, z/VM (guest support-only), and z/VSE operating system environments), attached through the IBM System Storage TS1120 Tape Controller Model C06, is available on System z servers through ESCON® or FICON™ channels. Refer to the Software requirements section for details.

**Planned availability date**

September 5, 2008

Availability of programs with an encryption algorithm in France is subject to French government approval.

**Description**

The TS1130 Tape Drive (machine type 3592) is the third generation follow-on to the highly successful TS1120 Tape Drive Model E05, 3592 Tape Drive Model J1A, and the 3590 Enterprise Tape Drive. It is designed for high-performance tape applications, including:

- High-speed data-save operations where backup windows are critical, and large amounts of data are archived to tape.
- Large-scale automated tape environments where performance and reliability are required.
- Large-scale mass data archive applications where massive amounts of data need to be quickly saved to tape for storage and later recalled (examples include the seismic industry, data warehousing, and record management applications).

**Capacity**
The TS1130 is designed to provide up to 1 TB uncompressed capacity, 42% more native capacity than the TS1120 Tape Drive, and over three times the native cartridge capacity of a 3592 Model J1A. The exact ratio depends on which cartridge is used with the tape drive. The following table compares the cartridge capacity of the TS1130 versus the TS1120 and the 3592 Model J1A:

<table>
<thead>
<tr>
<th>Cartridge Capacity</th>
<th>TS1120 (E05)</th>
<th>TS1130 (E06)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM 3592 Tape Cartridge (Extended)</td>
<td>NA</td>
<td>700 GB</td>
</tr>
<tr>
<td>IBM 3592 Tape Cartridge (Standard)</td>
<td>300 GB</td>
<td>500 GB</td>
</tr>
<tr>
<td>IBM 3592 Tape Cartridge (Economy)</td>
<td>60 GB</td>
<td>100 GB</td>
</tr>
</tbody>
</table>

The following table compares the cartridge capacity of the TS1130 E06 Tape Drive with the TS1120 E05 Tape Drive and 3592 Tape Drive Model J1A at 3:1 compression:

<table>
<thead>
<tr>
<th>Cartridge Capacity</th>
<th>TS1120 (E05)</th>
<th>TS1130 (E06)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM 3592 Tape Cartridge (Extended)</td>
<td>NA</td>
<td>2.1 TB</td>
</tr>
<tr>
<td>IBM 3592 Tape Cartridge (Standard)</td>
<td>900 GB</td>
<td>1.5 TB</td>
</tr>
<tr>
<td>IBM 3592 Tape Cartridge (Economy)</td>
<td>180 GB</td>
<td>300 GB</td>
</tr>
</tbody>
</table>

NA = Not applicable

Performance

The TS1130 E06 uses a design that increases the native data rate up to 160 MB/sec versus the 100 MB/sec data rate of the TS1120 Tape Drive Model E05. The TS1130 E06 is designed to offer improved access characteristics in search velocity and rewind time versus the TS1120 E05. The TS1130 E06 has other enhancements designed to help aid small file and Hierarchical Storage Manager performance.

Note: The actual throughput you may achieve is a function of many components, such as system processor, disk data rate, data block size, data compressibility, I/O attachments, SAN, and the system or application software used. Although the drive is capable of a 160 MB/sec native data rate, other components may limit the actual effective data rate.

Capacity scaling

The TS1130 Model E06 is designed to support capacity scaling of an individual tape cartridge to 20% of maximum capacity (128 GB for standard tape cartridges or 200 GB for extended tape cartridges). Capacity scaling lets the utilized length of tape to be logically shortened, allowing improved data access times in trade off for reduced capacity. The tapes can subsequently be scaled back to full capacity, as needed.

The TS1130 Model E06 Tape Drive allows an application to issue a command to scale the IBM Tape Data 3592 cartridge. Cartridges pre-scaled for 20% capacity are also available for order with the 3599 Models E11, E21, 011, and 021. These pre-scaled cartridges can be ordered (and labeled) for a specific VOLSER range. This allows capacity scaling to be exploited by an application that permits media pools to be defined by VOLSER range. You can exploit the capacity scaling capability of the TS1130 E06. For more information on using capacity scaling,

Media and cartridge capacity

The TS1130 E06 provides capacity leadership with media reuse and uses the JB tape cartridge with an advanced metal particle tape specifically optimized for the enterprise tape environment. This provides a native cartridge capacity of 1,000 GB (or up to 3 TB with 3:1 compression). This can be beneficial in space savings and economy of data storage since it can help lower the cost of storage per megabyte. For applications that fill current data cartridges, this can help reduce the number of tape cartridges required. The reduced number of cartridges may also help free up floor space for other requirements and reduce the number of automation slots used.

The robust 3590-style cartridge shell is designed to sustain a 1 meter drop. The cartridge has a similar form factor as the 3590 and 3490, allowing it to be used in 3494 and 3584 Tape Libraries and STK Silo ACS solutions. The IBM Enterprise Tape Cartridge 3599 also contains cartridge memory that is a passive, contactless silicon storage device. It is used to hold information about the specific cartridge, including the VOLSER, the media in the cartridge, and the drive.

Attachment options

The TS1130 E06 has dual-ported 4-Gbps native switched fabric Fibre Channel interfaces. This offers attachment flexibility in an open systems environment. The drives can be directly attached to open systems servers with Fibre Channel, or to ESCON or FICON servers with the TS1120 Tape Controller Model C06 or the IBM Enterprise Tape Controller 3592 Model J70.

The TS1130 is supported in a wide range of environments, including selected IBM Systems, Sun, and Hewlett Packard servers, as well as Intel®-compatible servers running Linux and Microsoft Windows operating system environments.

Statistical Analysis and Recording System

The TS1130 E06 uses Statistical Analysis and Recording System to assist in isolating failures between media and hardware. It is designed to use the cartridge performance history saved in the cartridge and drive performance history kept in the drive to determine the more likely cause of failure. It is designed to cause the drive to mark the media as degraded, and to indicate that the hardware has degraded.

High-availability data path failover and dynamic load balancing

High-availability data path failover is available with the AIX, HP-UX, Linux, Solaris, and Windows IBM tape device drivers. The failover mechanism is designed to enable you to configure multiple redundant paths in a SAN environment that includes the TS1130. In the event of a path or component failure, the failover mechanism is designed to automatically enable error recovery to retry the current operation using an alternate, preconfigured path without aborting the current job in progress. This supports flexibility in SAN configuration, availability, and management.

A function in the AIX, HP-UX, Linux, Windows, and Sun Solaris tape device drivers, Dynamic Load Balancing, is also available for the TS1130 E06 Tape Drives used in a SAN environment. The dynamic load balancing support is designed to improve resources for devices that have physical connections to multiple Host Bus Adapters (HBA) in the same machine. When an application opens a device that has multiple HBA paths configured, the device driver determines which path has the HBA with the lowest usage, and assigns that path to the application. The device driver is designed to dynamically track the usage on each HBA as applications open and close devices, and balance the number of applications using each HBA in the machine. This can help optimize HBA resources and improves overall performance.

Additional enhancements

The TS1130 E06 incorporates tape enhancements, introduced with the TS1120 Tape Drive Model E05 and the 3592 Model J1A Tape Drive, that are designed to help improve performance, capacity, and availability:

- High reliability of the 3592 drive and media maintained and improved with added features:
  - Giant Magneto Resistive (GMR) head technology introduced for the first time
  - Head overcoat technology into tape, introduced for the first time, offering improved head protection and wear characteristics
  - Improved standby power management that automatically reduces fan speed when idle to lower power dissipation and reduce the risk of unnecessary airborne debris contamination over extended idle periods
- Enhanced performance for such functions as Recursive Accumulating Backhitchless Flush
as well as the addition of a new Same Wrap Backhitchless Flush (SWBF) function that extends virtual backhitch effectiveness for large files.

- \( N+1 \) power supplies: The TS1130 E06 supports \( n+1 \) power supplies when it is installed in an automation frame. This is designed to help increase drive availability in the event of a power supply failure.

- Digital speed matching: The TS1130 E06 is designed to dynamically perform digital speed matching to adjust the drive’s native data rate to the net host data rate (after data compressibility has been factored out). This is designed to help allow slower hosts to stream the tape drive.

- Channel calibration: The channel calibration feature is designed to allow for customization of each read/write data channel for optimum performance. The customization can enable compensation for variations in the recording channel transfer function, media characteristics, and read/write head characteristics. The TS1130 E06 is designed to automatically perform recalibration in the field if it detects degraded performance.

- High resolution tape directory plus enhanced search speed: The TS1130 E06 Tape Drive maintains a tape directory structure with a high granularity of information about the physical position of data blocks on the media. This feature, plus the increased search speed, allow the TS1130 E06 to have improved nominal and average access times for locate operations versus previous IBM tape drives.

- Streaming Lossless Data Compression (SLDC) algorithm: SLDC is an implementation of a Lempel-Ziv class 1 (LZ-1) data compression algorithm. It is an extension to Adaptive Lossless Data Compression (ALDC) and is designed to offer an improvement over previous IBM lossless compression algorithms.

In addition, the TS1130 E06 offers the following enhancements over the 3592 Model J1A Tape Drive:

- Large internal data buffer: The TS1130 E06 Tape Drive has a 1 GB internal data buffer versus a 512 MB maximum in the TS1120 Model E05. Along with enabling higher performance characteristics, the data buffer is designed to use support read ahead of compressed data from tape and provide high performance random skip forward sequential (short hop) locates common in database search and tape software recycle operations.

- Offboard data string searching: The TS1130 E06 Tape Drive can search the data content of host records for string matches offboard from the host server. The tape drive can perform this search at maximum data rate (160 MB/sec native) while it would take much longer for a host server to read the data, buffer the data to disk, and then parse the actual data stream with host software routines.

- Enhanced logic to report logical end-of-tape (LEOT): LEOT is now reported based on a combination of capacity-based and position-based LEOT indicators. The TS1130 E06 monitors the total accumulated number of physical tape datasets written to the volume and will report LEOT based on this capacity-based LEOT value. This allows tape copies to complete without overflow a much higher percentage of the time.

Product positioning

The TS1130 Tape Drive is the follow-on to the highly successful TS1120, 3592 Model J1A, and 3590 Enterprise Tape Drive. The TS1130 is supported in a wide range of environments, including IBM Power Systems, IBM System i, IBM System p, IBM System x, and other servers running AIX, HP-UX, Linux, Sun Solaris SPARC, and Microsoft Windows operating system environments. Support for IBM System z (z/OS, z/VM (guest support-only), and z/VSE operating system environments), attached through the TS1120 Tape Controller Model C06, is available on System z servers through ESCON or FICON channels. It has significant performance and capacity benefits over the IBM 3590, as well as other half-inch tape drives such as the IBM 3480, 3490, and 3490E.

The TS1130 is designed for high-performance computing environments where high reliability, capacity, and performance are mandated. You should consider it in the following environments:

- Current enterprise tape drive applications in TS3400, TS3500, and 3494 Tape Libraries, Sun Silo, or stand-alone environments where:
  - Space allocated to tape cartridges needs to be reduced within automation solutions or offline storage.
– Backup windows are growing and there is a need for higher performance tape drives to back up larger amounts of data in less time.
– A Fibre Channel-attached drive with native switched fabric capability is required.

• Other large scale tape environments, such as:
  – High-speed data-save operations where backup windows are critical and large amounts of data are archived to tape.
  – Large-scale automated tape installations where performance, capacity, and reliability are requirements.
  – Large-scale mass data archive applications where massive amounts of data need to be quickly saved to tape for storage and later recalled (examples include the seismic industry, data warehousing, and record management applications).
  – Environments where both streaming and start/stop (access), large and small file workloads are required.

Other target customers for the TS1130 Tape Drive are encryption opportunities in medium to large enterprises in the financial sector, government and public sector, and other industries that must protect their customer tape data from loss or theft.

Reference information

Refer to:

• IBM System Storage TS1130 Tape Drive supports controllers and subsystems, Hardware Announcement ZG08-0544, dated July 15, 2008
• IBM System Storage TS1120 Tape Drive Model E05 supports encryption features, Hardware Announcement ZG06-0697, dated August 29, 2006
• IBM System Storage TS1120 Tape Controller 3592 Model C06, Hardware Announcement ZG06-0387, dated May 9, 2006
• IBM System Storage TS1120 Tape Drive Model E05, Hardware Announcement ZG05-0651, dated October 11, 2005

Trademarks

System Storage, System z, System p, System i, System x, FICON, and iSeries are trademarks of International Business Machines Corporation in the United States or other countries or both.

TotalStorage, z/OS, z/VM, z/VSE, AIX, ESCON, zSeries, OS/400, and pSeries are registered trademarks of International Business Machines Corporation in the United States or other countries or both.

Intel is a registered trademark of Intel Corporation.

Windows and Microsoft are registered trademarks of Microsoft Corporation.

Linux is a trademark of Linus Torvalds in the United States, other countries or both.

Other company, product, and service names may be trademarks or service marks of others.

This announcement is provided for your information only. For additional information, contact your IBM representative, or visit the IBM worldwide contacts page at: http://www.ibm.com/planetwide/