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Media Reliability Test

Fujitsu Siemens Computers Preferred Quality of LTO Tapes

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Why „Media Reliability Test“ (MRT)?

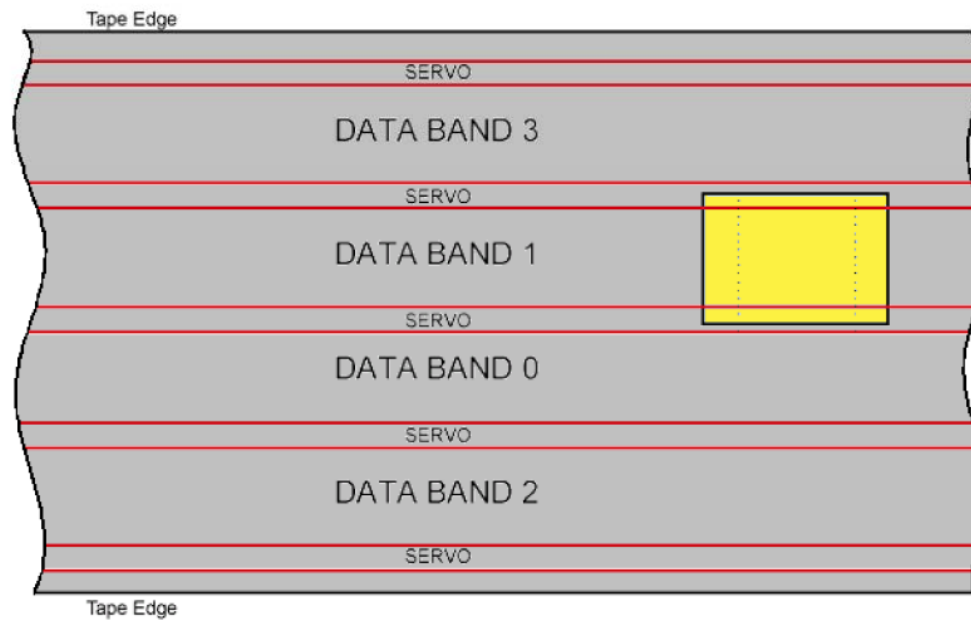
- Ensure the most reliable media for all Fujitsu Siemens Computers customers
- Reproduce customer head / media difficulties in our lab
- Ongoing quality tests of Fujitsu Siemens Computers released cartridges to prove high quality

LTO (Linear Tape Open) generations today

	LTO Ultrium 1	LTO Ultrium 2	LTO Ultrium 3	LTO Ultrium 4
Capacity(GB) uncompressed	100	200	400	800
Tracks	384	512	704	896
Tape length (m)	609	609	680	820
Compatibility				
Read Two generations backward	LTO-1	LTO-1 LTO-2	LTO-1 LTO-2 LTO-3	LTO-2 LTO-3 LTO-4
Write One generation backward	LTO-1	LTO-1 LTO-2	LTO-2 LTO-3	LTO-3 LTO-4

LTO Tape Layout (all generations)

Four Data Bands / Five Servo Bands

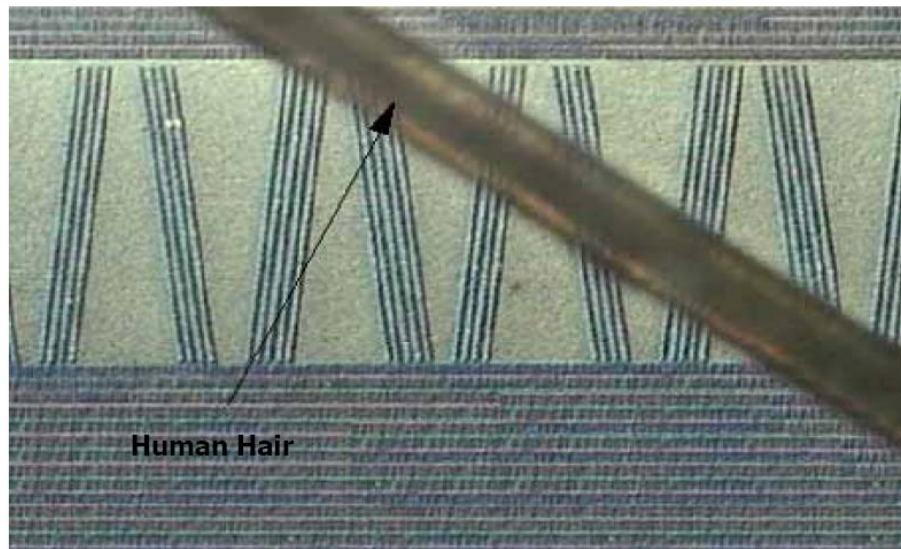


4 Data Bands
5 Servo Bands

Servo and Data Tracks, Human Hair

Linear Tape-Open (LTO)

(very close view)



Media Vendor Compatibility / Reliability

- All LTO drives are compatible to the media from all vendors
- Media duration depends on e.g.
 - Environment: Dust, temperature, humidity
 - Type of usage: Number of usage, time of exchanges, full tape writing
 - System performance: Data transferrate, start / stop mode
 - Cartridge handling: „Dropping“
- Most critical regions are the tape edges (region of outer Servo Bands)
- MRT mainly shows the differences in terms of the „edge duration“

Tape Inconveniences

- Almost all reported tape inconveniences occur during writing
- Data loss due to read inconsistencies are „nearly“ unknown
- All the following technical difficulties are reported as „Cannot Write Medium“
 - Host Bus Adapter -, cable -, switch - failures
 - Ignore drive cleaning requests
 - Drive hardware problems
 - Uncorrectable errors on the tape
- Extensive write problems may cause no actual valid backup
 - Running out of backup time window due to retries
 - Running out of allocated tapes
- The customer loses the trust to his tape backup

Test Equipement

- 15 LTO-4 Drives, IBM Full Height, HP Half Height
- 4 Fujitsu Siemens Computers Primergy Servers
- Different interfaces: SAS, FibreChannel, SCSI
- At least 20 cartridges per vendor running

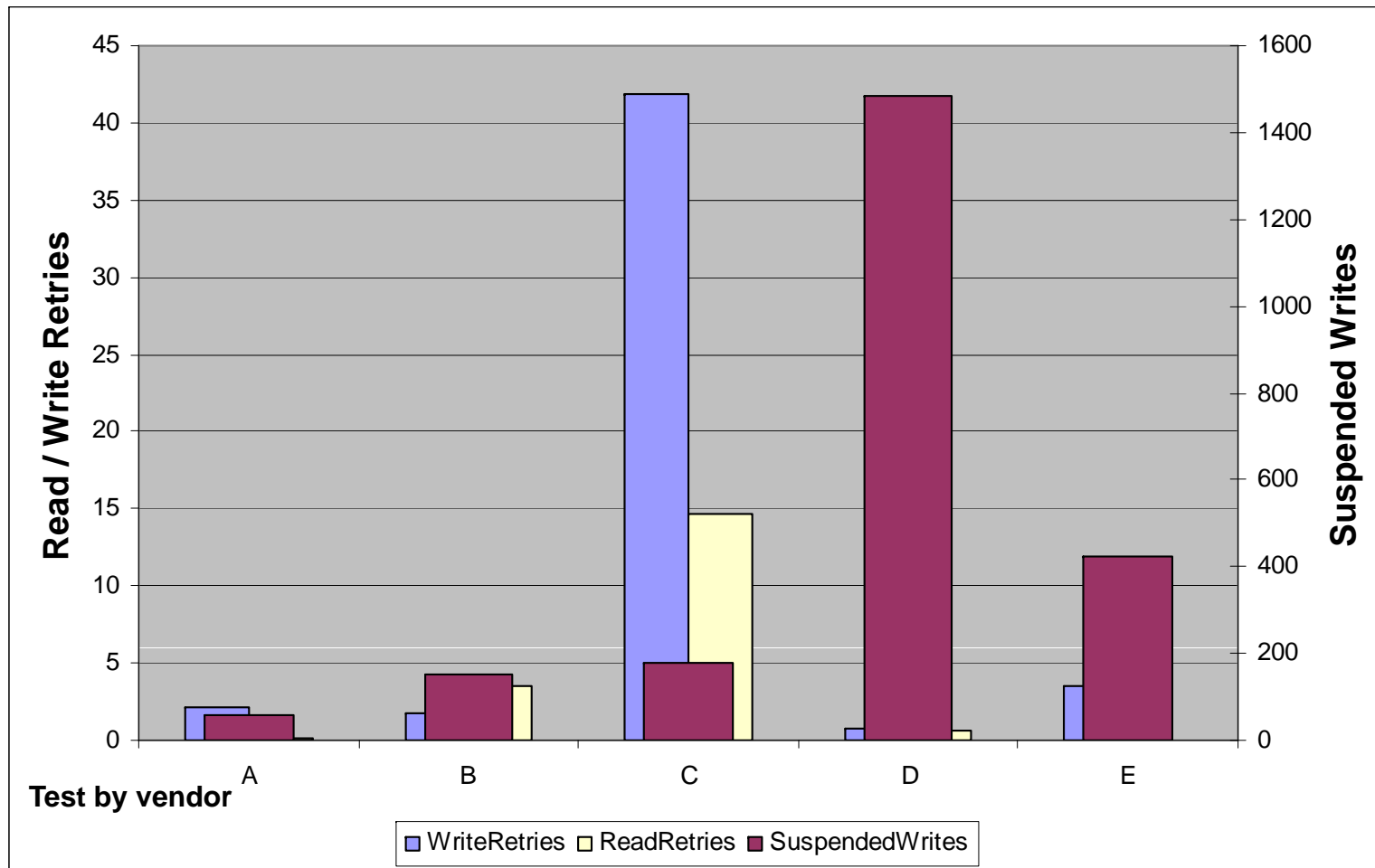
Media Reliability Test (MRT) Procedure for LTO-4

- 4 x 800 GB write and read (complete tape)
- write a filemark at 700 GB to the tape
- 110 x write the last 100 GB to the tape (only at the edge)
- 4 x 800 GB write and read (complete tape)
- Reading the error logs continuously

Logged Errors during Reading / Writing LTO Tapes

- Read Retries
 - Tape drive has to stop and repeat the reading process
 - Lead to loss of performance
- Write Retries
 - Tape drive writes the data again due to Read-after-Write failure
 - Lead to loss of performance and capacity
- Suspended Writes
 - Tape drive writes the data again due to loss of servo Information
 - Lead to loss of performance
- Please note: Several thousands of them may lead to a cartridge failure

MRT Results for LTO-4 cartridges / Average per vendor



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Success of the MRT @ Fujitsu Siemens Computers

- Demonstration of differences in media durability
- Improvements of the media at manufacturer side
- Avoidance of head/media related customer crises

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Our customers get the most reliable media –
high quality tapes from preferred vendors

Questions?