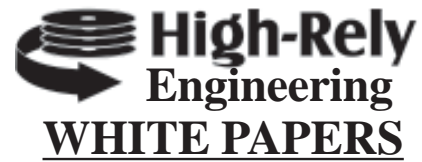


# RE: Comparing the Cost of Tape versus Hard Drive for Network Backup

by Thomas Hoops



**Summary: LTO-3 is the current popular tape archival solution. This paper analyzes the real world costs over 3 years of an LTO-3 Tape system with a comparably priced and configured High-Rely disk-to-disk solution and show that a High-Rely solution is truly less expensive.**

LTO-3 is presently a popular backup platform which many small to medium size businesses depend on. Here, we provide a Total Cost of Ownership (TCO) analysis over a 3 year period comparing a Quantum LTO-3 external drive system with two configurations of comparable High-Rely external systems.

**1. Equipment Costs.** We chose the Quantum LTO-3 CL1101, using the retail pricing from the maker's website at: <http://shop.quantum.com> This drive is an external unit, like the High-Rely systems we will use for comparison. The price used was the price shown as of January 9, 2007.

This system is a single drive unit with an Ultra160 SCSI interface. The reasonably suited controller card was the Adaptec 1821900 PCI SCSI controller. To be fair, the High-Rely eSATA systems were chosen which require an eSATA controller. However, both the HR1 and HR5 units are available as USB2.0 devices which do not require a controller in most cases. It was unclear whether either the SCSI controller or Quantum Ultrium 3 drive came with an interconnecting cable so we left out that detail. But, again, a USB or eSATA cable is usually much less expensive than a 68 lead Ultra SCSI cables is.

	<u>Tape</u>	<u>HR5</u>	<u>HR1</u>
Cost of Drive	\$2,799.00	\$1,275.00	\$195.00
Cost of controller	\$290.00	\$95.00	\$95.00
<b>Total of Drive Hardware</b>	<b>\$3,089.00</b>	<b>\$1,370.00</b>	<b>\$290.00</b>

## 2. Media Cost.

Trying to relate tape media to drive media is not easy, they are totally different systems. The practical life with a wise safety margin is really the only criteria here.

The rated life of LTO-3 tape media is about 250 runs. Field experience has shown that tape media in general is only good for about 50 runs on average. The tape drive selected here CLAIMS to extend the life of the tape so 150 runs is a fair but reasonable safety margin for this type of media. At 5 days a week with 2 weeks of backup time we will require 10 tapes over three years. We averaged the cost of LTO-3 media from NewEgg.com as of this writing to arrive at a media cost of \$75 per tape.

The rated life of the average hard drive is 5 years. As field experience has shown the average hard drive endures well beyond 3 years. Thus 10 drives for 3 years is a reasonable safety margin

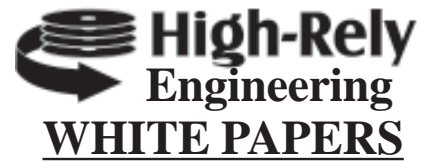
It must also be noted that most tape drives require maintenance (head cleaning). Of course there is no such requirement for hard drive media. The cost of the cleaning media and time to perform the operation would further increase the cost of ownership of the tape solution but that is not accounted for here.

<u>Media</u>	<u>TAPE</u> 400GB	<u>HR-5</u> 400GB	<u>HR-1</u> 400GB
TAPE 5 days, 2 weeks deep for 3 years. CostEa Qty Needed	\$75.00 15	\$1,125.00	
HRMEDIA (disk) 5 days, 2 weeks deep for 3 years. CostEa Qty Needed	\$288.00 10	\$2,880.00	\$2,880.00
<b>Total Media Cost For 3 years.</b>	<b>\$1,125.00</b>	<b>\$2,880.00</b>	<b>\$2,880.00</b>

## 3. Software Cost.

The software cost is computed equally in all three systems. So for the purpose of this analysis, it is irrelevant. However, the HR system can function as a logical drive. Thus free software which copies files from a drive/location to another drive/location can be used on the HR system.

	<u>Tape</u>	<u>HR5</u>	<u>HR1</u>
Cost of Software	\$500.00	\$500.00	\$500.00



In considering the initial system costs, there is another omitted item which would weigh against the tape solution: installation and training. HR Systems, may require nothing more than connection with a USB cable and configuring software already provided with your operating system. The Tape solution however requires installation of controller card and a configuration and setup which is not for the faint hearted so expect the expenses of a professional.

**4. Operating Costs.** Here, the LTO-3 and HR-1 are placed on the same level since each device requires the changing of media for backing up on a 5-day by 2 week strategy. As can be seen below, if labor costs are accounted for, the minor up front investment difference between the HR-5 and HR-1 is well worth it. Yet, the HR-5 total system cost is still below the LTO-3.

The differences are dramatic between the LTO-3 and HR-5 solutions. Another unaccounted factor is time and trouble required for restoring data. Tape is sequential meaning that you have to wait to stream past other data until you reach the position on the tape where the data you want to restore resides. Also, if for some reason, multiple files need to be restored which are not within the same physical proximity of each other, the task can be time consuming. The HR disk solution is not prejudiced on file location on the media or the order it was stored making restores many, many times easier and quicker.

	<u>Tape</u>	<u>HR-5</u>	<u>HR-1</u>
Daily Operation			
Hours/Day	0.5	0.5	0.5
Days/Week	5	1	5
Hourly Employee Cost	\$20.00	\$20.00	\$20.00
Total Employee Cost/wk	\$50.00	\$10.00	\$50.00
<b>Employee Cost for 3 yrs</b>	<b>\$7,800.00</b>	<b>\$1,560.00</b>	<b>\$7,800.00</b>
Hours per year of servicing	11	4	4
Total service hours for 3 yrs	33	12	12
Service rate/hour	\$75.00	\$75.00	\$75.00
<b>Total Service Costs</b>	<b>\$2,475.00</b>	<b>\$900.00</b>	<b>\$900.00</b>
<b>Total Labor Costs</b>	<b>\$10,275.00</b>	<b>\$2,460.00</b>	<b>\$8,700.00</b>

**5. Total and Monthly cost.** We have left depreciation out also. But, it is a fact that second hand hard drives still carry a decent resale value whereas used tapes simply do not carry any. Again, this additional cost increase in the Tape solution is not considered here.

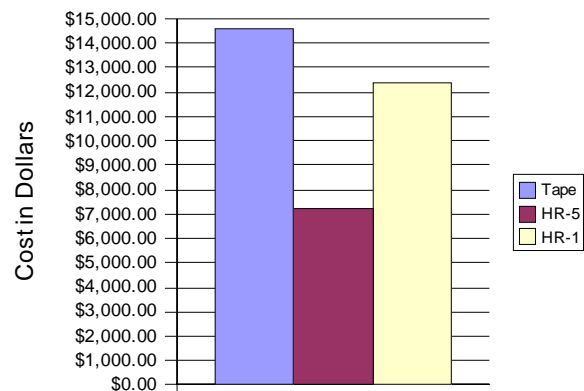
Switching media also takes much longer when searching for files. Tapes systems require much more time to read and organize their directories after insertion than disk media.

	<u>Tape</u>	<u>HR-5</u>	<u>HR-1</u>
<b>Total Cost for 3 years</b>	<b>\$14,614.00</b>	<b>\$7,210.00</b>	<b>\$12,370.00</b>
<b>Total monthly cost</b>	<b>\$405.94</b>	<b>\$200.28</b>	<b>\$343.61</b>
<b>Dollars/GB (RAW) for 3 years</b>	<b>\$73.07</b>	<b>\$36.05</b>	<b>\$61.85</b>

**Conclusion:** It is obvious in this analysis that the HR-5 system is the best value with a TCO of nearly 1/2 of the LTO-3 solution. It's also interesting to note that the HR-5 system in this application is also cheaper than the HR-1 system because of media switching labor costs. It should also be mentioned that media repair/recovery services are available for hard drives and not for tape.

It is hard to see any justification in selecting a tape based system unless compatibility with legacy systems which are tape based is necessary. Presently, the main advantage tape offers is the cost per gigabyte in terms of raw media costs. But when other real-world costs are factored in which practical use of tape systems require, the cost per gigabyte no longer comes in under that of disk based media.

**3 Year Backup Solution Costs**



- Additional LTO-3 system costs not considered:**
- Cables.
  - Installation, configuration and training.
  - Tape drive maintenance and supplies.
  - Higher depreciation
  - Restoration times are higher.