Market Analysis

Where Is the Optical Drive Market Going?


By Mary Craig

Strategic Market Statements

Overproduction will lead to chaotic markets that will last throughout 2002 and into 2003. Competitive technology advancements continue to put pressure on optical vendors to develop viable high-capacity optical storage devices.

Recommendations

- Optical drive manufacturers must manage inventory more efficiently.
- Optical drive manufacturers must manage more timely product introductions.
- Optical archive products must keep pace with tape.
Marketplace Description

The optical drive market covers a broad range of products, including read-only, recordable-only or write-once read-many (WORM) and rewritable drives, utilizing magneto-optical (MO), phase change and ablative technologies with varying capacity points.

Products in the read-only category include CD-ROM and DVD-ROM drives, while the rewritable segment includes CD-ReWritable (CD-RW), competing formats of rewritable DVD, 3.5-inch MO, 5.25-inch MO and phase change drives. The recordable or WORM category comprises of stand-alone drives, such as CD-Recordable (CD-R), two competing formats of recordable DVD technology and 12-inch WORM. Combination DVD drives have recently emerged, which feature multiple recordable and rewritable features along with read-only capability.

Trends and Issues

CD/DVD-Based Drives

CD-ROM and CD-RW

CD-ROM drives remain integral to nearly all new PCs that are shipped. The main reason is because no other comparably priced optical drive exists. Manufacturers of CD-ROM drives continue to take cost out of their products, and prices can be expected to continue to fall, albeit at lower rates.

PC OEM adoption of CD-RW drives is strong. Although, in the past, CD-RW products have been primarily purchased for storing audio, they are increasingly being used to store and back up data files. They are also being used in other consumer applications, including the storage of digital photographs, small video and graphics files for archival purposes, or simply freeing up space on the hard drive.

CD-R and CD-RW disc prices are significantly lower than any recordable/rewritable media prices on the market today. Drive prices have fallen below $99 and will continue to decline in the coming years. At the same time, performance has been improving and, as software enhancements can be expected to enable advancements in the functionality and ease of use of CD-RW devices, Gartner Dataquest believes that the combination of capacity, price and performance of these optical devices will continue to accelerate their demand.

CD-RW is in higher demand on consumer PCs than on corporate/professional PC systems. However, as the price differential between CD-ROM and CD-RW drives narrows and, assuming compatibility is ensured in Mount Rainier-compliant CD-RW drives (Microsoft’s operating system support initiative), the acceptance of CD-RW over CD-ROM drives in the corporate environment will most likely accelerate.
**DVD-ROM**
Gartner Dataquest is not convinced of strong market demand for stand-alone DVD-ROM drives, except in mobile PCs. The major market inhibitors continue to be lack of content, lack of software that requires the available capacity of 4.7GB on a DVD-ROM disc for distribution, and a price that is too high — although falling rapidly — to incite PC OEMs to replace all CD-ROM drives with DVD in desk-based PCs. CD-RW drives (and their successor combination products that combine CD-R/RW functionality with DVD-ROM read capability) are the major competing technologies. Gartner Dataquest believes that CD-RW products have and will continue to negatively impact the long-term growth of stand-alone DVD-ROM drives.

**Combination CD-RW/DVD-ROM**
Gartner Dataquest believes that the eventual adoption of combination CD-RW/DVD-ROM and rewriteable DVD products will naturally grow the installed base of DVD-ROM drive technology. The practicality of the combination CD-RW/DVD-ROM drives in saving a slot in mobile PCs will serve as a bridge to the time when users will require higher-capacity rewriteable DVD optical drive technology.

**Recordable/Rewritable DVD**
Three different rewritable DVD combination drive formats have been vying for end users' attention. In this light, growth in the rewritable DVD market continues to be challenged by multiple contradictory formats. Each camp is a force to be reckoned with. Each is powerful and technically astute. DVD-RAM had the time-to-market advantage, but the drive and media prices stymied immediate high-volume sales. Compaq, IBM and Apple were the first computer system OEMs to embrace the product, but DVD-RAM was offered as an option or landed preconfigured in expensive high-end systems that generally yield lower volumes. Apple dropped the DVD-RAM drive early in 2001 in favor of Pioneer's DVD-Recordable (DVD-R) drive. However, the DVD-RAM contingent has been successful in meeting the needs of the optical library systems market and other storage applications, such as backup devices, in lieu of tape on small, low-end servers. But these markets are not large enough to create a large volume of drive shipments.

Pioneer is betting on home movie editing as the "killer app" that will drive up volumes of DVD-R drives, as audio recording was to CD-R. Gartner Dataquest is convinced that is where it must start as a compelling consumer application. But, as is the case of an early-adopter segment, the percentage of the population dedicated and patient enough to edit many hours of aging home video content on tape is insignificant, relative to the percentage required for mass-market acceptance.
The DVD+ReWritable (DVD+RW) alliance is positioning products to address video and data storage applications, supporting writing in random and sequential fashions. As is the case of DVD-RAM, the DVD+RW format is designed for PC/data applications with full defect management. The Mount Rainier initiative also calls for Microsoft operating system support of DVD+RW.

Gartner Dataquest believes that the three different rewritable formats will co-exist for some time. As a result, efforts are being made by some manufacturers to make it easier for the consumer by offering drives that combine some (but not all) formats into one drive. A format recently approved by the DVD Forum is called DVD Multi, which supports recording and playback of DVD-RAM, DVD-R and DVD-Rewritable (DVD-RW). DVD Multi products, introduced by Hitachi-LG and Panasonic, are also capable of reading and writing CD-R and CD-RW. Drives launched in the fourth quarter 2002 support recording and playback of DVD-R, DVD-RW, DVD+Recordable (DVD+R), DVD+RW, CD-R and CD-RW, but not DVD-RAM. Gartner Dataquest believes that work is being done to develop a drive that combines all formats to remove all guesswork for the end user.

Early market penetration of rewritable DVD formats will come from sales to the aftermarket retail channel, but long-term success is dependent on these formats’ ability to prevail in the PC OEM channel. The changing dynamics of the PC marketplace will have a significant impact on the future for rewritable DVD drives. The PC marketplace continues to consolidate around the top three vendors (the new HP, Dell and IBM). Although other computer system vendors (for example, Apple) cannot be ignored, the success of any manufacturer or product depends on winning the favor of these top companies. In winning the hearts of OEMs, rewritable DVD drive vendors will consistently be challenged to reduce the cost of their drives and media, while still maintaining a high level of reliability. While most OEMs are convinced to offer rewritable DVD solutions with their PCs, success for these products and market share leadership will be equally dependent on marketing and creating demand for these products from the end user, be it the consumer or the commercial user. Ongoing price erosion in the PC market, combined with the build-to-order and configure-to-order operating models, means that, in the long term, choices will reside largely with the end user. Success of any of these formats will not be based on any activity by a standards group or committee. The winner in this format battle will be determined by which product sells the most and thus becomes a de facto standard.
MO/Phase Change Drives

3.5-Inch MO

Historically, the prices of 3.5-inch MO drives, especially in relation to their capacity, have prevented them from achieving mass-market acceptance on a worldwide basis. Japan has been, and will continue to be, the major consumption market for 3.5-inch MO drives. PC users in Japan have never embraced tape drives for applications that require high capacities. Some examples of applications include offloading hard disk drives, data backup, and file exchange, and transport in multimedia, desktop publishing and pre-press markets. Drives with capacities of up to 2.6GB are available, and this higher capacity will help make this technology even more attractive (albeit still primarily in the Japan market). However, even in the Japan market, these products face stiff competition from other low-capacity removable solutions, such as CD-RW.

5.25-Inch MO and Phase Change

The firm standards that have been in place for a decade and through four generations of 5.25-inch optical disk drives are crumbling. For many years, the companies that made 5.25-inch MO or phase-change optical disk drives — Sony, Matsushita, Hitachi, Olympus, Maxoptix and Most — worked together to ensure their products were compatible through the successive 1x, 2x, 4x and 8x generations. When the time came to plan the next generation of drives, Matsushita, Olympus, Hitachi and Most dropped out of this market altogether. Rather than pursue the next generation, which was to be 14x, MaxOptix placed its energies behind its emerging Optical Super Density (OSD) technology, leaving Sony as the sole supplier of 14x drives for HP and Plasmon, which manufacture the jukeboxes. After more than three years of development efforts, MaxOptix failed to deliver and consequently abandoned its OSD technology as well as any other attempts to develop next-generation alternative high-capacity optical technology as of September 2001. Products being shipped today using the 8x (5.2GB-per-disk) and the 14x (9.1GB-per-disk) generations of drives continue to adhere to the current standards.

High-Capacity Optical Technology

Blu-ray Disc

Drive manufacturers are already planning for (and arguing about) the next-generation optical disc using blue-violet lasers. On one side is a camp called Blu-ray Disc Founders, which consists of nine companies that are also members of the DVD Forum — Hitachi, LG, MEI, Pioneer, Philips, Samsung, Sharp, Sony and Thomson Multimedia. And on the other is Toshiba, the chair of the DVD Forum. Designed initially to accommodate HDTV content recording, the Blu-ray Disc specification calls for capacity points of 23.3GB, 25GB or 27GB in a single layer on one side, respectively, while Toshiba is developing a disc upon which 30GB may be recorded in double layers on a single side.
UDO

The road map for the next generation of 5.25-inch optical storage has taken some twists and turns since it was first announced in late 2000, when Sony revealed its plans to develop a follow-on technology to 5.25-inch MO disks. The new technology, called Ultra Density Optical (UDO), was supposed to ship in late 2002 or early 2003. Based on the same or similar disk and drive dimensions that are currently in use, the UDO format was designed with jukebox OEMs, notably HP and Plasmon, in mind.

Utilizing phase change media and a 405nm wavelength blue-violet laser, UDO was supposed to supersede today’s 5.2GB and 9.1GB MO disks. It was originally designed to contain an initial capacity of 40GB per disk (20GB per side) — increasing to 80GB and 120GB per disk — and with an initial data transfer rate of 4 MB/sec to 8 MB/sec. It was also supposed to be a true write-once disk that did not rely on the drive to protect the disk from being overwritten. Like today’s 5.25-inch MO drives, UDO is intended for near-line storage. One of the most important aspects of the specification is that it can fit into existing 5.25-inch libraries. UDO disks will have the same diameter and thickness as today’s 5.25-inch optical disks and will fit into the same cartridges.

The unexpected twist came in the spring of 2002, when Sony quietly abandoned the UDO project. Plasmon has since stepped up as the developer of UDO technology and is working on a 30GB capacity in its first-generation drive. Plasmon is positioning the new technology as an application of the Blu-ray Disc consumer technology for the professional optical storage market.

Plasmon is targeting its Generation 1 drive, with a capacity of 30GB per disk (15GB per side), to ship in August 2003 to be followed by its Generation 2 drive with a capacity of 60GB per disk (30GB per side) in 2005. Also on the company’s road map is its Generation 3 drive with a capacity of 120GB per disk (60GB per side) to ship in 2007.

It remains to be seen if Plasmon will succeed and, if it does, when the product will actually become available. Gartner Dataquest has tracked several new and different high-capacity optical technology developments over the years. It was with disappointment and dismay that we observed delays and the eventual demise of TeraStor’s Near Field Recording and MaxOptix’s Optical Super Density, for example.

Holographic

Various companies have performed research and development (R&D) around holographic data storage technology for several years, but this technology still has not materialized into any salable products. However, this technology still holds promise for the future, and large and small companies alike continue to invest in R&D for holographic storage. Large institutions, including IBM, have ongoing engineering projects for holographic storage. Aprilis, based in Cambridge, Massachusetts, is an example of a small company that is developing holographic-based storage products. Aprilis started operations in 1999 to commercialize proprietary holographic data storage technology, and the company announced in early
December 2000 that it had received an initial multimillion dollar round of venture capital financing, led by Zero State Capital. InPhase Technologies, based in Longmont, Colorado, is another small company that is developing holographic data storage media and systems. InPhase was formed in late January 2001 as a spinoff of Lucent, and it uses technology in recording media and systems that was developed at Bell Laboratories, the R&D arm of Lucent.

Holographic storage is fascinating, and company after company has been lured by its promises of massive capacities and extremely fast access. Although storage vendors will and should continue to keep a watchful eye on developments in this area, Gartner Dataquest does not expect to see commercialization of this technology in the foreseeable future. In spite of the vast sums of money that have been invested in holographic storage technology, and even though prototypes of products have been demonstrated, questions still exist as to whether this technology can be reduced to form factors that are competitive, whether it can be mass-produced, and above all, whether it can compete on price with other storage products.

Gartner Dataquest Perspective

The CD/DVD-based drive market fell to commodity status at the end of 2000. The overproduction of CD-RW and DVD-ROM drives, coupled with the economic downturn and the resultant decline in the PC market, has driven average selling prices (ASPs) to new lows. The good news is that optical drive shipments are expected to increase on an annual basis. The bad news is that shipments currently exceed the world's actual need for new higher-performance optical drives. The x-speed race in the CD-ROM drive market has spilled over to the CD-RW, combination CD-RW/DVD-ROM markets and soon to the emerging recordable/rewritable DVD drive markets with even shorter product cycle life spans. This activity results in price wars to unload excess inventory of older products and will eventually lead to the quickened consolidation of a handful of manufacturers based in Korea and Taiwan to produce high-volume, low-priced optical drives.

Gartner Dataquest believes that unstable pricing environments and chaotic market dynamics will continue to exist throughout 2002 and into 2003. A second-half economic recovery, if it occurs, will be minor but meaningful. However, as the industry matures, all optical drive makers will need to keep a watchful eye turned toward the disruptive threat of surplus production. Excess supplies will certainly lessen the hope, much less the chances, for profitable market management.

**Key Issue**

How will storage subsystems evolve during the next five years?