The Next Generation of CDs

by Peter Marval

When CD audio products were introduced in 1982, they took the entertainment industry by storm. These spinning silver discs made it possible to store vast amounts of information inexpensively on reliably, mass-produced media. Since then, more than 400 million players and six billion discs have been sold. The CD-ROM (read only memory), has proved to be equally successful in computer applications with an estimated 35 million CD-ROM drives sold in 1996 alone.

Enter the Digital Versatile Disc (DVD), the next stage in the evolutionary chain of Compact Disks.

Whereas audio CDs and regular CD-ROMs can hold a maximum of 680 megabytes of data or 74 minutes worth of playing time, a single-sided, five-inch DVD can store at least 4.7 gigabytes, or 133 minutes of playing time - sufficient to handle 92 per cent of all feature-length films.

The DVD is a hybrid of two rival groups of consumer electronic companies, one led by Toshiba and the other by Sony. Each team had independently created their own designs. However, neither the motion picture industry nor the computer industry wanted incompatible formats on the market, and a possible replay of the VHS/Betamax debacle. An unprecedented agreement reached in late 1995 between the two development groups combined the best elements of each design, expanding the scope of the DVD to its fullest.

How it works

How can you pack this much data onto a CD-size disk? The key is in refining the laser which reads the disc. Because the DVD-ROM drive uses a shorter-wavelength light than the standard CD-ROM drive, it can read data pits which are twice as small as those on a CD. Also, DVD data spiral tracks are closer together, resulting in a data spiral in upwards of 11 kilometers long - more than twice the length of a CD's.

Another essential difference is the data layer is only half as thick as that of a conventional CD, allowing manufacturers to bond two layers onto a double-sided DVD disk of the same thickness as a CD (1.2 mm). This design provides 9.4 GB of storage, although you need to turn the disk over to access the data on the other side.

Designers have also hit on a way to squeeze even more data onto one side of a DVD. By using a semitransparent gold layer atop the reflective silver-coloured layer, the DVD can store two layers of data on one side. Using a lower-power beam, the laser can read the data from the gold layer; then, with an increase of power, it can access and read the silver layer. This method results in slightly less than double the capacity of a single layer, but it still results in an impressive 8.5 GB per side. Finally, it is possible to combine two dual-layer platters into a double-sided DVD with a whopping capacity of 17 GB - roughly enough for an 8-hour movie.

The multi-layer design also offers advantages in addition to increased capacity by reducing errors caused by disc tilt and warping.

DVD Players

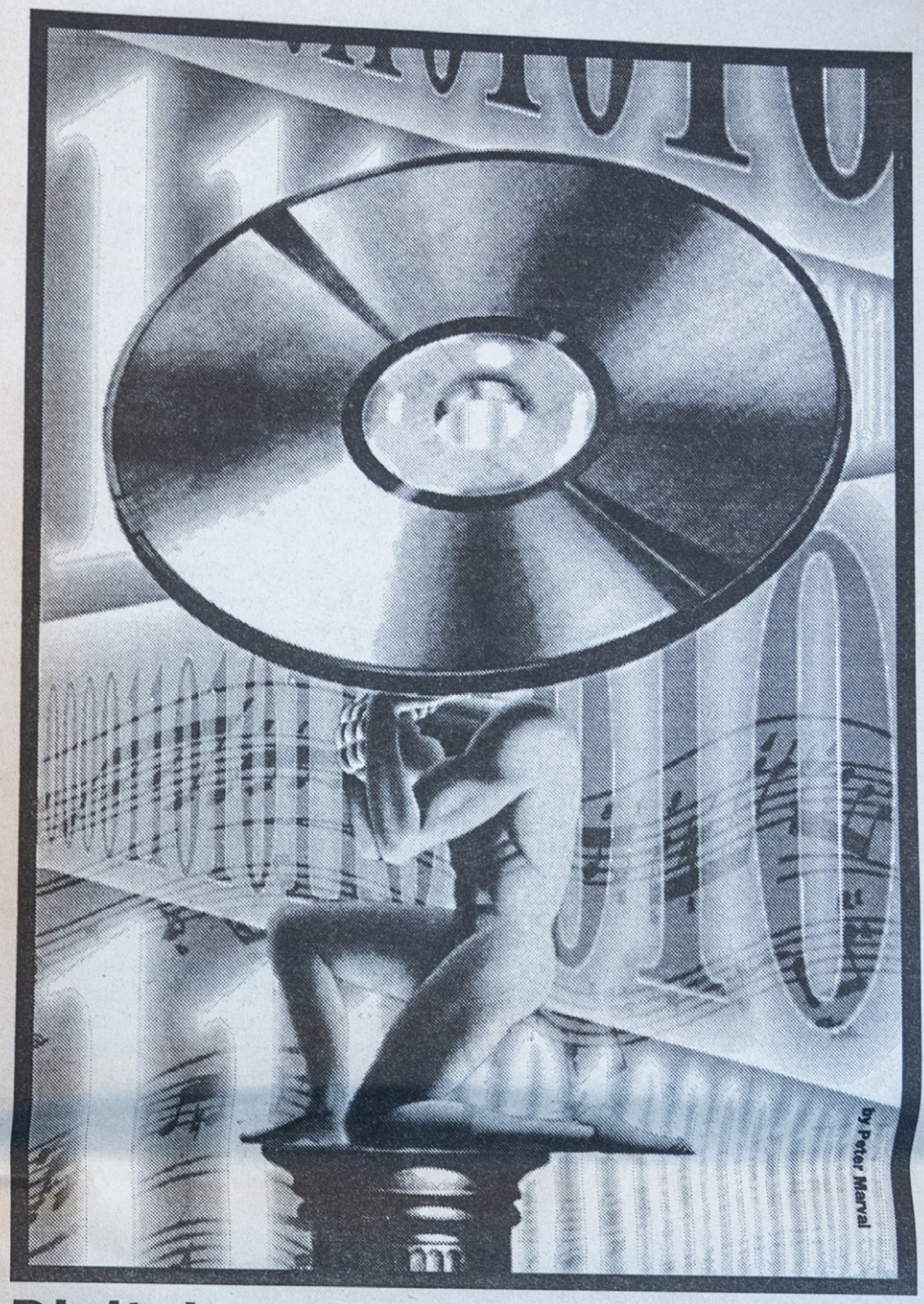
DVD players, due out on the market sometime before summer, boast a wide range of features that will more than satisfy any videophile's appetite.

"DVD will take the home theatre atmosphere to another level," says Lindsay Takashima, a DVD marketer for Toshiba Canada. DVD provides a digital picture more than twice as sharp as videotape, and about 20 per cent sharper than high-quality laser discs. Most movies on DVD will be ready for Dolby Digital which recreates movie-theatre captivation by delivering sound into six channels of Surround Sound technology.

Most importantly, the DVD player is backwards compatible and will be able to play a regular CD, making it the centre piece for home entertainment.

That's the good news. The bad news is that for now DVD is playback only, which some industry insiders feel may limit DVD's initial success.

"There will still be a market place for VHS because it's still a viable recording format," explains Takashima. "As soon as DVD becomes recordable and affordable for the mass market, I think the VHS will eventually fall by the wayside. But that's quite a few years down the road."



Digital Versatile Discs (DVDs) promise to drive VCRs, CD Players, CD-ROMs and Laser Discs into extinction

Ironically, the success the DVD recording format promised to deliver, almost brought about its demise. Hollywood executives, fearful of having high quality films easily reproduced with no loss of quality and already losing billions of dollars annually to piracy, did not support DVD. Realizing the hardware was useless without the software, a multi-industry Copyright Protection Technical Working Group was formed and developed a scrambling scheme based on encrypting prerecorded movie disc content.

As for the price of DVD movies, Takashima said thanks to low manufacturing costs they should retail for about $20. "From a cost of packaging, transportation and storage, it's more economical than videotape and less wasteful."

Consumers can expect the first DVD players to cost between $600 to $1,200.

Will DVD Replace CD Audio?

While it is possible to place all of Beethoven's nine symphonies on one DVD disc, expanded storage capability is not necessary for the majority of albums, most of which can fit on a conventional CD.

And while a better sounding disc can be produced from DVD, it will probably not replace CD audio - at least not yet, says Takashima. "The recording industry is formulating some standards for DVD audio, but I don't think it will replace the CD itself."

If anything, Takashima feels DVD audio initially may only be used in place of double set CDs or box sets.

DVD-ROM, Videos on Computers

There are plenty of CD-ROM titles that span multiple CD-ROM disks but could be republished on one DVD-ROM disk through a procedure known as repurposing. For example, the six disk CD-ROM version of Phone Disc Power Finder USA One (one of the first DVD titles to have been announced) can easily fit on one single sided, single-layer DVD disk, with room to spare. The multime-

continued on page 15

cont'd from page 13

dia content of computer games has increased so much that multiple-disk CD-ROM games are common place - another prime candidate for repurposing. Digitized photo collections, encyclopedias and large reference databases would also be ideal.

However, many software developers are taking a "wait and see" approach before hopping on the bandwagon. DVD's increased storage capacity is not needed for anything beyond video, which historically has done nothing for playability of games. Most top-selling games, such as Duke Nukem 3D (98.9 MB) and Mech-Warrior 2 (122 MB), don't come close to filling a 650 MB CD-ROM.

Phil Adam, Vice President of computer gaming company Interplay stated, "At present, we have no titles in development (for the DVD format), but that can change based on the acceptance and mass market of this new standard."

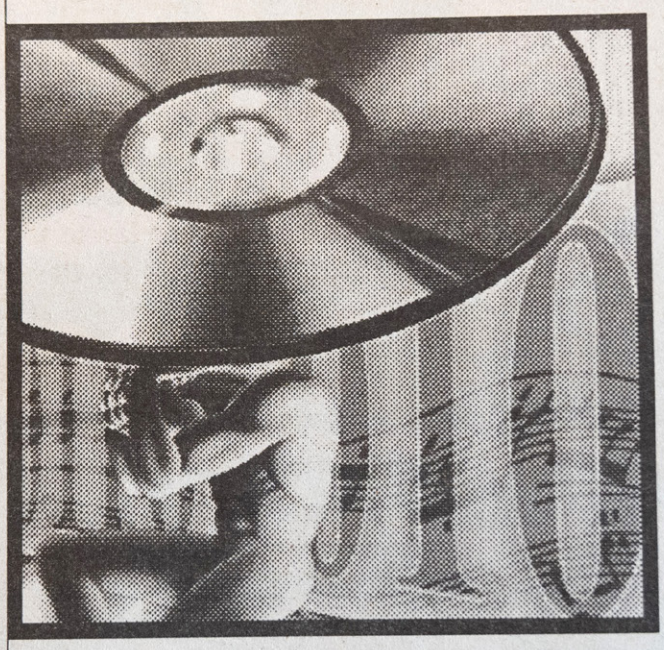
Hardware manufacturers have different theories as to when DVD will be embraced by consumers. Toshiba, Compaq, IBM, and Hewlett-Packard have all announced plans to ship DVD-ROM drives, either as stand alone devices or in their new lines of systems, in early spring. Many in the industry say they see DVD's mass arrival coming in 1998.

DVD-ROM will allow you to view movies on your PC with the same quality as a DVD player, listen to audio CD recordings and play your current CD-ROM games with a 6x to 8x speed backward compatibility.

Also on the horizon is DVD-RAM, a read/write/erase design, which will have an initial capacity of 2.6 GB, not 4.7 GB, because of the difficulty of producing write lasers with small enough wavelengths. Depending on the cost of media, DVD-RAM could even mount an attack on the myriad of removable data storage devices currently used by PCs.

The Road Ahead

Perhaps the most exciting aspect of DVD is its potential. For example, the development of reliable shorter wavelength lasers emitting green or blue light currently in the works may extend data density to 50 GB on one 1.2 millimeter-thick platter - essentially a small library on one disk.



In the meantime, those craving the leading edge will take the leap to DVD and endure growing pains. If history is any guide, it's safe to assume the economics of high-volume production will rapidly drive down prices, making DVD affordable in the next couple of years. Add to that DVD's CD compatibility and the fact that it lets entertainment titles cross over from home players, DVD will probably establish itself as the accepted medium - until the next advancement comes along.

DVD Capability

In addition to unparalleled video and audio playback capabilities, DVD players will have the capability of providing a choice of viewing options:

- The standard 4:3 viewing mode, or press a button and you can watch the movie the way the director intended for it to be watched: in the letterbox format.

- A special anamorphic mode designed to provide full-screen high resolution pictures on those lucky enough to own advanced widescreen (16:9) sets.

- A built-in parental control system. A parent selects the rating to be viewed - PG, PG-13, R, or NC-17 - and the player automatically shows a version of the movie edited to that rating level by producers of the film.

- A studio could give viewers the option of seeing the director's cut, or the theatrical release. Movie producers also have the ability to include multiple story lines, scenes shot from different angles and the capability to present soundtracks in eight different languages and up to 32 distinct subtitles.

- DVD movie discs will also feature brief biographies of main actors appearing in films, as well as revealing every film he/she has done.