Consumer Demand and the Emerging Markets for Recordable DVD

An IDC White Paper
Sponsored by Pioneer Electronics

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EXECUTIVE SUMMARY

Digital versatile disc (DVD) is a fast-growing optical storage technology that is moving rapidly into both home and business markets enabled by standalone and PC-based recording and playback devices.

Video is the killer application that is both enabled by and a driver to the recordable DVD (DVD-Rec.) market. IDC studies of early adopters show that the majority of users expect to store video that they have captured and edited themselves.

IDC believes that, over time, recordable DVD drives and media will also be popular as a higher-capacity removable media for other types of data storage. But this will not be a primary driver for adoption. In particular, DVD-Rec. drives that record CD and DVD media will have an advantage in the home environment because of the availability of low-cost media. The proliferation of a family of digital capture devices (e.g., digital still cameras and digital video mini-cams) will accelerate the move to recordable DVD storage as users quickly come to grips with the limitation of CD-R.

The opportunity for DVD recording in the PC industry is an exciting one. The technology can position the PC as the key driver to connect multiple home entertainment technologies, from TVs and set-top devices to music players, camcorders, digital cameras, and gaming devices. It can drive a legitimate, functional need for faster and more powerful computers with the latest in multimedia chips and devices.

PC manufacturers will ship high-end home PCs with recordable DVD drives as a differentiator to provide "future-proofing" for customers. These PCs will be equipped with the fastest processors, large amounts of memory, largest hard disks, and highest-resolution display technology to support the high-quality video and audio that DVD enables. Therefore, DVD recordable drives will be a key feature to preserve the popularity of high-end home PCs.

Two serious obstacles must be overcome before the PC industry can realize the full benefit of DVD recording technology.

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Analyze the Future

Compatibility will emerge as the major challenge for the DVD industry as users look for reassurance that media once written can be played on a wide selection of devices. In particular, the recordable DVD will provide an important bridge between PC and TV as home video is captured, edited, and prepared for distribution among family and friends. Education is the second key challenge the industry faces, helping consumers recognize and embrace the benefits of DVD recording. Suppliers should note that consumers need assurances about DVD compatibility and education about how to maximize the potential of DVD technology.

INTRODUCTION

DVD is a storage technology that uses optical techniques to read and write digital information on removable discs.

Digital versatile disc (DVD), the successor technology to CD, is a storage technology that uses optical techniques to read and write digital information on removable discs. Like the CD drive, the DVD drive reads a spinning disc by detecting a change in reflectivity while scanning over the data layer of the disc. CD and DVD drives write to a spinning disc by creating pits with a laser beam. Rewriteable CD and DVD drives are capable of removing pits to restore the reflective surface in preparation for writing new information.

DVD media stores significantly more data than CD media.

While CD and DVD discs are the same size, DVD media stores significantly more data than CD media. Much of this increase is the result of higher density because of smaller pits: DVDs use 0.4 micron pits, and CDs use 0.8+ microns. In addition, a DVD can have two layers of information on each side. The laser that reads the disc can focus either on the top layer or on the second layer through the first layer. While CDs hold 650–700MB of data, the capacity of a DVD disc ranges from 4.7GB per single-layer side to 17GB per disc for dual-layer two-sided recordings.

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From a functional point of view, DVD discs have the capacity to store 133 minutes of high-quality video and associated sound, which makes them ideal media for the distribution of movies with multiple sound tracks in up to 8 languages and subtitles in up to 32 languages. DVDs may also be used to store traditional computer data files, music and other sound (almost 8 hours per side), still images, and motion video from different sources (e.g., broadcast TV, digital camcorders, and MPEG files).

DVD drives and media are important removable storage systems for the computer industry and the entertainment industry.

DVD drives and media are important removable storage systems for two different industries: the computer industry and the entertainment industry. For the entertainment industry, the highest current usage is playing a pre-recorded read-only DVD movie. For the computer industry, uptake has been slower because the CD remains a

sufficiently high-capacity removable storage medium for most business uses. Using the DVD-ROM drive for DVD movie playback has been the most prominent new computer application.

Categories of DVD

The following small family of DVD products has been designed to serve the computer and entertainment industries.

- **DVD-Video** is a read-only format used by the entertainment industry to provide movies that are of high video quality and provide surround sound including multilanguage options. DVD-Video discs are sold primarily in the consumer marketplace to be played on standalone DVD players. The DVD-Video market is characterized by plentiful drives and plentiful titles.
- **DVD-ROM** is a read-only format used by the computer industry to provide software products along with motion video and sound. DVD-ROM also offers a higher-capacity alternative to CD-ROM for applications demanding larger amounts of data, such as large databases and application software as well as interactive multimedia titles. DVD-ROM drives are increasingly embedded in PCs. The DVD-ROM market is characterized by plentiful drives and few titles. Today, the DVD-ROM drives installed on PCs are used mostly as CD drives and recorders and to play DVD-Video.
- **Recordable DVDs (DVD-Rec.)** are purchased as blanks and can be used to record information once or more than once (erase and re-record), thus allowing users to make copies of multimedia data. While DVD-Video and DVD-ROM standards are singular, there are several approaches to recordable DVDs. The first distinction is between DVDs that can be recorded just once and those that can be recorded, erased, and recorded again. In addition, multiple standards exist for both write-once DVD and rewriteable DVDs.

Incompatibility among DVD drives and their associated DVD discs is a matter of significant concern to customers, technology suppliers, and OEMs.

Multiple standards create an environment in which DVDs written to one standard cannot always be played by drives that support a different standard. Incompatibility among DVD drives and their associated DVD discs is a matter of significant concern to customers who are evaluating new DVD products and technology suppliers and OEMs that are attempting to bring winning products to market.

DVD and CD Will Coexist

IDC believes that users will continue to maintain a mix of DVD and CD discs. CD and DVD libraries accumulate quickly, both in the form of acquired read-only discs and discs recorded by users. Digital optical discs (i.e., both CD and DVD) constitute an archive of information that users expect to access for many years to come.

Combination drives are popular because they allow end users to upgrade to a single device that offers new functionality while maintaining access to legacy discs.

Recognizing this commitment to both CD and DVD, suppliers have designed combination drives capable of playing and recording discs to meet different standards. Combination drives are popular because they allow end users to upgrade to a single device that offers new functionality while maintaining access to legacy discs. IDC believes that virtually all DVD video players and DVD-ROM drives

will continue to read both CD and DVD media and that the vast majority of DVD-Rec. drives will read and write to CD and DVD media.

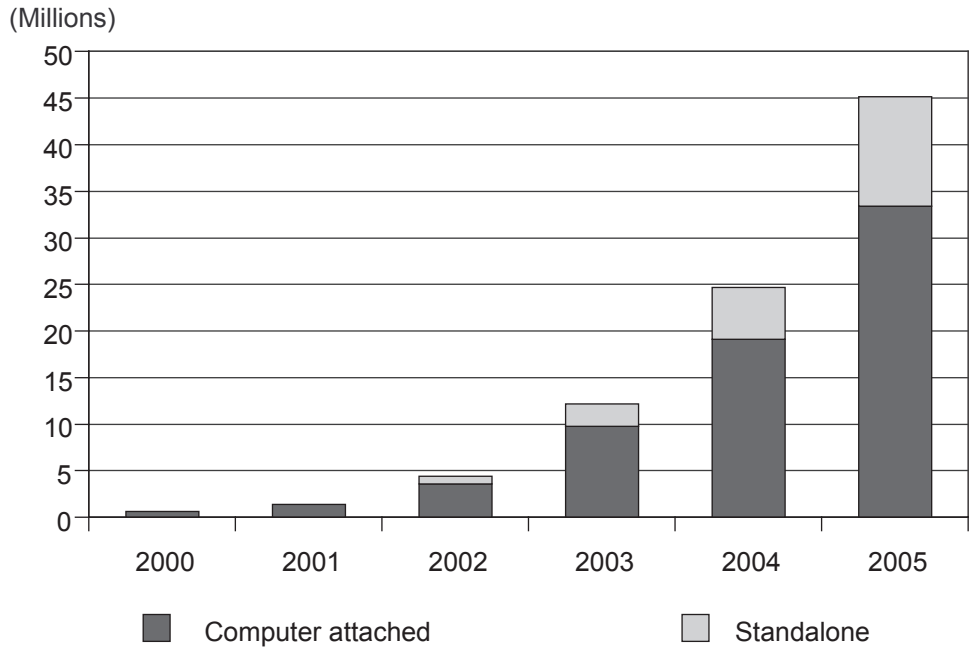
DVD Market and Usage Findings

IDC research on DVD markets indicates continued rapid growth. Companion research on DVD users shows that video will be the dominant application for DVD recorders.

IDC estimates that more than 3 million drives will be shipped in 2002, with the market growing to more than 30 million drives by 2005.

Recordable DVD drives have been shipping in significant numbers since 2000, as Figure 1 shows. (Recordable (write-once) and rewriteable DVD drives include DVD-R, DVD+R, DVD-RAM, DVD+RW, and DVD-RW drives.) Beginning in 2002, a measurable segment of the drives are packaged as standalone devices, while the majority of drives are attached to PCs. IDC estimates that more than 3 million drives will be shipped in 2002, with the market growing to more than 30 million drives by 2005.

Figure 1: Worldwide DVD Recorder Shipments, 2000–2005



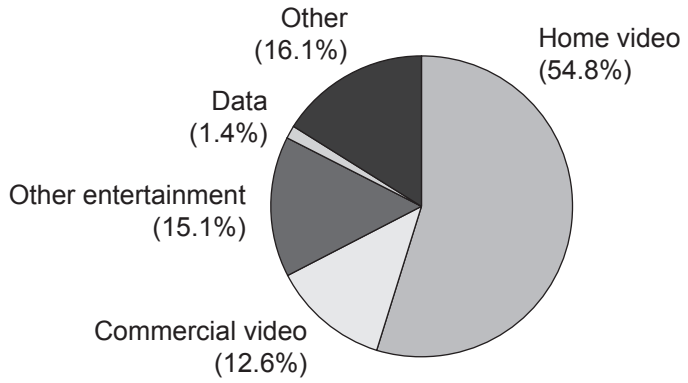
Source: IDC, 2002

In May, IDC conducted a random digit-dial telephone survey of consumers to better understand how DVD technology would be put to use. More than 1,000 U.S. households participated in the study, which painted a rich picture of the emerging DVD marketplace. IDC asked participants if they have a CD or DVD recorder. The households that had a CD/DVD recorder (>200) were asked in-depth questions about their intended usage of the DVD recorder.

IDC found that the majority of users and future buyers of DVD recording devices intended to use them for storing video information.

IDC found that the majority of users and future buyers of DVD recording devices intended to use them for storing video information, as Figure 2 shows. More than 54% of the respondents indicated that they would use recordable DVD primarily for home video editing and storage, and an additional 12.6% indicated interest in storing commercial video on DVD. Less than 2% of these households planned to use DVDs primarily to store data.

Figure 2: Intended Usage for DVD Recorders, 2000–2005



Source: IDC, 2002

RECORDING APPLICATIONS OF DVD

DVD recording technologies are maturing at a time when both computer and entertainment users are faced with increasing storage needs.

DVD recording technologies are maturing at a time when both computer and entertainment users are faced with increasing storage needs. For those primarily interested in DVD as part of an entertainment system, multimedia recording is the primary use. For those primarily interested in computer storage, data recording is the primary use. However, a computer, especially the home desktop PC, also makes an attractive tool for video editing and recording.

Multimedia Recording

Consumers with libraries of audio and still images have learned that writing a CD is a good solution to increased demand for storage space. As video storage shifts from analog VHS tape to digital video, and when recordable DVD arrives in the marketplace at sub-$400 price points, then these consumers will migrate to DVD to find the capacities needed for video storage.

Data Recording

Computer users will increasingly use recordable DVD as removable media for large amounts of simple data. Just as recordable CD provides an inexpensive archival medium, DVD will be useful for archiving correspondence, financial transactions, catalog databases, and so forth.

Computer users will find DVD more attractive as they create and receive more “rich data.” Rich data is information that includes not only text and diagrams but also high-quality images, sound, and video. Computer users create rich data with applications such as Microsoft PowerPoint or Macromedia Flash — applications that can create vivid presentations of information.

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Computer users accumulate rich data when browsing the Internet, downloading multimedia-training materials, or receiving enriched information from fellow users. Applications such as voicemail environments hosted on the PC create audio data, which is another form of rich data. All of these rich data applications demand gigabytes of capacity in excess of the recordable CD.

VIDEO DVD ON TV VERSUS PC

The two primary "operating environments" for DVD are the set-top box with display and menus on a TV monitor and a built-in or accessory drive attached to a PC.

The two primary "operating environments" for DVD are the set-top box (standalone player/recorder) with display and menus on a TV monitor and a built-in or accessory drive attached to a PC. Use-cases, that is, scenarios of typical usage, are different for these two environments, both for viewing (playing) and for recording information to DVD.

Viewing Video

Users who enjoy DVDs high-quality video will prefer larger TV screens and better sound systems and will embed DVD technology in their home entertainment environments. PC users, particularly those who travel with DVD-equipped laptop computers, will value portability and use their computer displays and sound systems to view recorded DVDs when away from home.

Recording Video

TV viewers will use DVD recorders and media in much the same way they use analog tape VCR today.

TV viewers will use DVD recorders and media in much the same way they use analog tape VCR today. This market segment will value simple DVD devices that make the recording process as easy as possible. The DVD device will provide rudimentary editing, such as the ability to remove segments of a recording. Also, CE-based DVD recorders will be used to save and archive programming, and combination hard drive set-tops (personal video recorders) with DVD recording will ultimately come to market.

Recording video information to DVD on the PC will be more complex. PCs are not ordinarily connected to a real-time feed of video information, but they can be. Some users will obtain and install TV cards to the PC so that they can receive and capture broadcast and cable video. (Microsoft's Freestyle PC may lead this effort.) Other users will download video from the Internet.

Video capture will be most commonly accomplished with digital mini-cam recorders, however, and IDC believes that this peripheral will be the most common way that users bring video content to the PC.

Video capture will be most commonly accomplished with digital mini-cam recorders, however, and IDC believes that this peripheral will be the most common way that users bring video content to the PC. Digital recorders are designed to make the short-term storage and electronic transfer of information simple. Users will move data from the mini-cam to the PC with a high-speed connection such as Firewire, the IEEE 1394 protocol.

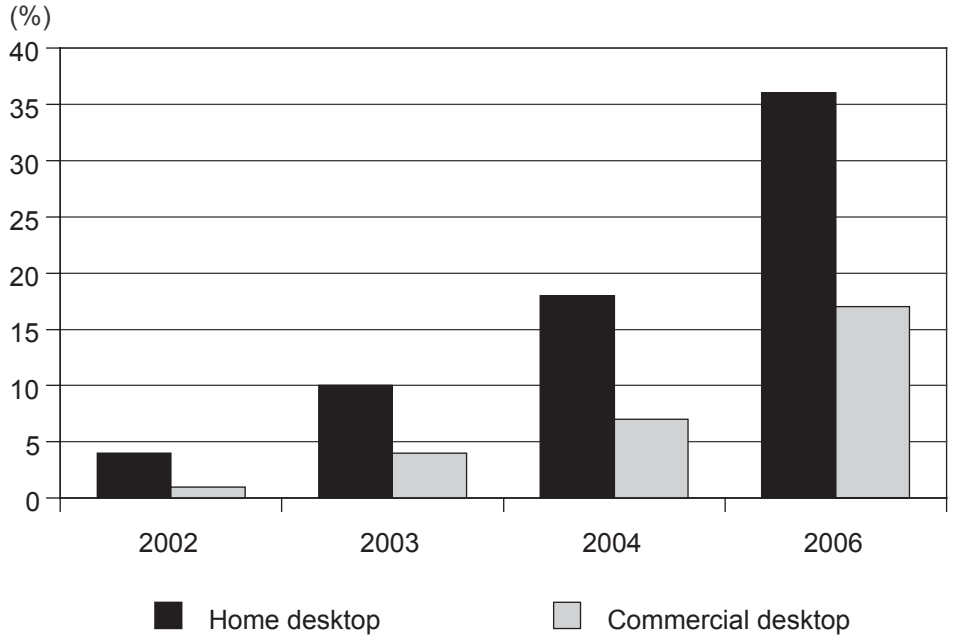
In addition to simple recording and editing capabilities, the PC recording environment can have far greater flexibility to make finer-grained edits, to resequence material, to add audio channels, and so on.

DVD Video for Home Versus Business PCs

IDC forecasts that home desktop computers are far more likely to have a recordable DVD drive in 2002.

IDC research illustrates the different interests of home and business PC users by looking at the proportion of PCs configured with recordable DVD drives. As Figure 3 shows, IDC forecasts that home desktop computers are far more likely to have a recordable DVD drive in 2002. The trend continues through 2006, when 36% of home desktop PCs will ship with recordable DVD drives, while only 17% of business desktop PCs will be similarly equipped. This distinction is a reflection of the different appeal of video applications (home PCs) and data applications (business PCs).

Figure 3: PC Attach Rates for Recordable DVD Drives, 2002-2006



Source: IDC, 2002

The DVD market can be segmented in several ways. Figure 3 examines home versus business use of DVDs on the PC platform. Entertainment versus business usage divides the market as well. PCs playing a role in both segments and are joined by standalone devices designed specifically for the entertainment segment.

Recordable DVD Video and TV/PC Compatibility

An increasing number of users will have DVD capability on both the PC and TV. These users have come to expect that pre-recorded DVD movies will play in both environments. In IDC's recent study of CD/DVD recording usage, we investigated a variety of user expectations for recordable DVD. Two findings are of particular interest.

For a majority of respondents (57%), it was very important or important that the self-recorded disc be compatible between the PC and TV environments.

For a majority of respondents (57%), it was very important or important that the self-recorded disc be compatible between the PC and TV environments. Forty-three percent of the respondents indicated that this compatibility was extremely important.

This finding suggests that users are less concerned about where (or perhaps whether) they edit video DVD while being quite concerned about where they can play back DVD. In particular, the data suggests that users want the freedom to use the DVD as a sharing medium both across and beyond the boundaries of their office and household.

DVD RECORDING MEDIA

DVD recording technologies come in two forms: write-once and rewriteable.

Write-Once Applications

Write-once DVD media such as DVD-R is similar to CD-R and offers users the ability to store video or data on a DVD permanently. DVD-R discs can be read repeatedly.

Users who make a DVD-R disc are most interested in an archival copy that is inexpensive and simple to make, that is compatible with a wide array of DVD players and DVD ROM drives, and that is non-volatile over many years.

Rewriteable Applications

Rewriteable DVDs are especially useful for a regular program of backup and restore, for example, because the same disc can be recycled many times.

Rewriteable technology is analogous to CD-RW and offers users the ability to record, erase, and re-record on the same disc. Users who record a rewriteable discs value the ability to erase a disc for reuse. As a result, rewriteable DVDs are especially useful for a regular program of backup and restore, for example, because the same disc can be recycled many times. Rewriteable DVDs are also useful for storing and changing (editing) content without the need to write to a new disc.

Rewriteable media are more costly, and IDC expects that trend to continue. This is because write-once volumes will ramp faster than rewriteable volumes and gain economies of scale. From a usage point of view, the single use of a rewriteable DVD will remain more expensive than the single use of a write-once disc. Users will quickly discover when to use these two complementary types of media.

DVD COMPATIBILITY AND ITS IMPACT ON KILLER APPLICATIONS

An important part of the recipe for success in the CD market was the presence of an independent organization involved in setting standards.

Compatibility emerged as a key issue in the CD market, with consumers demanding compatibility with music players and business users demanding compatibility across lines of PC and server hardware. An important part of the recipe for success in the CD market was the presence of an independent organization involved in setting standards. Standards developed and endorsed by an industry consortium eased the risk of deciding which standard to choose for drive and disc manufacturers as well as OEMs. Compatibility was never tied to a corporation, but rather to a consortium.

It is useful to consider how the issue of compatibility manifests itself when examined in the context of the many applications that will depend on DVD technology in the near future. The key applications will provide users with the ability to record and replay audio, still image, digital camcorder, gaming, and PC storage data. We examine each in turn.

Compatibility and Audio Applications

The "music CD" will remain a pervasive standard, and consumers will expect new combination drives to be compatible with existing CD formats.

The MP3 format is particularly important for young audio enthusiasts. MP3 extends the use of digital technology and compression for audio storage. Users are able to record to MP3 and share files over the Internet. MP3 also provides a link between music CDs and new solid-state MP3 players. Other audio file formats are becoming more pervasive as well, such as WMA and MP3Pro. These other formats offer similar usage patterns, but some copy and content protection.

While standalone (versus PC-connected) CD recorders for audio recording are not common in American households (single digit penetration), IDC expects standalone DVD recorders for video recording to be much more common than CD recorders were.

Compatibility and Still Image Applications

Digital still cameras are creating a large storage need for many consumers. Recordable CDs are commonly used today to store images much as photo albums were used in the past. Moreover, a copy of a recordable CD can be used to share images with family and friends. Today's recordable CDs have set an expectation for compatibility for this community of users.

Recordable DVD technology will allow still images to be woven into slide shows and mixed with channels of audio and snippets of video.

In addition to providing larger capacity, recordable DVD technology will allow still images to be woven into slide shows and mixed with channels of audio and snippets of video. Users will likely create and play these modern analogs to the carousel of 35mm slides on the PC. More important, they will expect standalone DVD players connected to TVs to play these discs as well.

Compatibility and Digital Camcorder Applications

Compatibility between the cameras, the PC drive and the TV player will be key success factors for growth in the digital camcorder market.

Digital camcorder sales are increasing as analog magnetic tape systems move toward sunset. Digital camcorders will produce enormous storage needs beyond the practical capacity of CD technology. DVD storage and sharing will be a key requirement for this segment of users. Compatibility between the cameras, the PC drive, and the TV player will be key success factors for growth in the digital camcorder market. The Firewire port on set-top DVD recorders and home PCs will be the key link between the camcorder and the DVD recorder.

Compatibility and Gaming Applications

Today most applications are delivered as pre-recorded content on read-only CD and read-only DVD media. However, many of the new popular games are recorded onto DVD for use on Sony's PlayStation 2 and Microsoft's Xbox.

Games are changing, however, and IDC believes that, in the future, recordable DVD will play a key role in enabling players to download and customize their games as well as to download and save purchased music.

Games are changing, however, and IDC believes that, in the future, recordable DVD will play a role in enabling players to download and customize their games as well as to download and save purchased music. Players will store games in progress, perhaps transport them to a different site, and move the play forward at that location on a different platform.

Devices such as PlayStation 2 and Xbox are also Internet enabled. With recordable DVD technology on board, gamers will have access to the same set of Internet-related activities. Downloading and storing music and video files in a removable and compatible format on the gaming platform will be added attractions for game users.

Compatibility and Data Applications

OEMs track the PC market and attempt to adopt and integrate removable media technologies into their products in anticipation of buyer needs.

To understand the issues of compatibility for the PC and its data applications, it is first important to recognize the role of the OEM in the PC marketplace. OEMs track the PC market and attempt to adopt and integrate removable media technologies into their products in anticipation of buyer needs. The two competing demands from OEMs are as follows:

- OEMs need low price points to fit their budgets in a highly competitive market. This is often a rigid demand, particularly for small and midrange PCs.
- OEMs need new features to differentiate their products in that same competitive market. New features are ordinarily used to differentiate the high-priced products.

OEMs are interested in optical removable media as a replacement for magnetic floppy discs. The small capacity of a floppy drive compared with today's file sizes makes it nearly useless for everyday backup or file sharing purposes. CD-R and CD-RW fill this need today, but sophisticated users realize that CD capacities will be exhausted in the coming years.

IDC believes that when purchasing new equipment, users will entertain a combination drive that will play and record CDs and DVDs because it provides a significant degree of "future proofing."

Compatibility, Compatibility, Compatibility …

Every killer application of digital technology requires a removable storage solution that has compatible drives, media, and standards. Expected usage shows that without compatibility, analysts and early adopters will sound alarms that suppress not only the market for DVD technology but also the growth of products that depend upon DVD in order to thrive.

The computer and consumer entertainment industries need to work hard to achieve a high degree of compatibility and to educate the consumer about the benefits of DVD as a bridge technology.

Compatibility is a cornerstone for DVD to achieve its full potential: the bridge between the PC and the TV. The computer and consumer entertainment industries need to work hard to achieve a high degree of compatibility and to educate the consumer about the benefits of DVD as a bridge technology.

Consumers are overrun with still images, video footage, and rich data on their PCs, and they can now turn to recordable DVD for archival needs.

Opportunities and Challenges in the DVD Market

DVD markets are driven fundamentally by the ravenous appetite for storage media in both the consumer and business market segments.

DVD markets are driven fundamentally by the ravenous appetite for storage media in both the consumer and business market segments. Video and multimedia require an enormous amount of storage capacity; thus, these applications will be the primary opportunity for DVD suppliers going forward.

The primary challenge for DVD suppliers is to address the contrasting needs of two customers — the entertainment consumer and the business user:

- Consumers want low-cost, simple, long-lived ways to play their existing libraries of CD and DVD music and videos. Further, they want to make and share copies of digital pictures, sound, and video. Low-cost, simple, write-once technologies best fit the needs of this community.
- Business users are looking for an alternative to CD-R and CD-RW for removable media. There is not as stringent a need for sharing data widely in the business community. The ability to rewrite DVD media is more of an advantage for data applications (i.e., backup and recovery) in the business community.

The consumer need to archive digital images and video exists today and will continue to grow dramatically. On the other hand, CD-R/RW is still sufficient for almost all data applications. Therefore, the consumer segment will lead DVD adoption.

Confusion in the supplier ranks is sending out shock waves to potential buyers and leading to lower rates of acceptance. Standards confusion will make market conditions challenging for all players.

Suppliers need to understand and reflect these overlapping but distinguishable needs and to unite around standards that best meet them. Confusion in the supplier ranks is sending out shock waves to potential buyers (e.g., consumers, PC buyers, and OEMs) and leading to lower rates of acceptance. Standards confusion will make market conditions challenging for all players.

CONCLUSION

DVD technology is moving into multiple markets at a feverish pace. DVD provides solutions to both the need for increased storage capacity and also provides a bridge among standalone and PC platforms. Video storage will be the primary application that creates demand for DVD in the home market; other markets, such as the business market, will profit from the ubiquity of the DVD standard.

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02C3428NEWMED3428
July 2002

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