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DIGITAL DIGEST

A Quarterly Journal Providing Market Research From Digital Tech Consulting

IN THIS ISSUE

This market research digest is designed to give you a glimpse of some of the research that Digital Tech Consulting is preparing for publication. Here is some of the research currently available from DTC:

The Business of Digital Copyright: *Content Protection and Management in the Consumer Digital Era (Now available at discounted price)*

U.S. Digital Terrestrial TV Market: *From HDTV to Multicasting*

Internet Media Services: *Emerging Pipelines for Consumer Media Content* (Forthcoming in Fall 2003)

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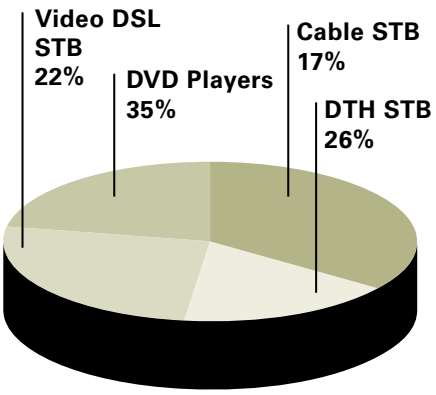
MPEG-AVC Poised to Usher In High-Definition Video

As high definition slowly makes its way into the world of digital media, bandwidth — perpetually inadequate — will become ever more an issue. New hardware-based technologies, such as the new blue-laser optical disc technology (see Blu-ray story on page 2) are already in later stages of development, positioning to deal with digital media's ever increasing bandwidth/storage needs. But it will fall to compression-based solutions to squeeze the most out of today's pipelines and usher in a new product cycle of high-definition video and multichannel video services.

The MPEG-4-AVC standard, just one of several names for the emerging video codec also known as H.264, MPEG-4 Part 10 and JVT, is a leading contender for the next evolutionary phase of digital video. Providing a number of improvements and variations over MPEG-2, recent research by DTC suggests that MPEG-4-AVC will find application over a range of digital media pipelines over the next decade (see chart). Early areas of growth will surround optimizing video compression to allow increased capacity on networks and/or packaged media.

Forecasted MPEG-AVC % Units Shipped by Device (2005)



Source: Digital Tech Consulting

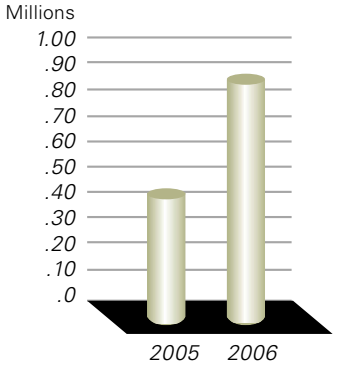
MPEG-4-AVC's primary advantage lies in its improved compression rate, twice to four times as efficient compared to MPEG-2 encoding. This means, for instance, an AVC-encoded high definition movie can fit on a standard DVD (DVD-5 or DVD-9) disc. Similar results can be realized over network infrastructures. Device suppliers, network operators and content owners benefit from having more capacity for transmitting high-definition material, but they benefit in another way, as well. Those network operators who still have analog programming (namely U.S. cable operators) would greatly increase the number of programs that can be transmitted on current infrastructure.

Current DTC research points to some 16 million hardware units utilizing AVC in 2008 – not an insignificant number, though it represents only a small percentage of total estimated digital set-top box and DVD player shipments in 2008. DTC believes that these early shipments will reflect a "market seeding" period in which a long transition from MPEG-2 to its successor begins. Many have argued that the transition from MPEG-2 to MPEG-4 will be smoother and speedier than the one from analog to digital, predicting more bullish forecasts. DTC believes, however, that because this transition represents incremental and evolutionary advantages rather than the sweeping advantages represented by an analog to digital transition, more conservative projections are justified.

Several industry groups will soon select a next-generation HD video compression standard for packaged media. MPEG-4 AVC is not the only video compression contender with Microsoft's Windows Media 9 also in the running. In addition, capacity improvements realized with new blue-laser technology might prolong the life of MPEG-2 on optical discs.

Staying within the MPEG family has its advantages since it is a known commodity and will conceivably create the least amount of disruption. As a result, most observers believe that MPEG-4 AVC will ultimately be chosen by the DVD Forum as the HD video codec. However, even a quick decision won't translate into an MPEG-4 AVC-enabled HD DVD player much before 2005 (see chart).

Forecasted MPEG-AVC Players Shipped



Source: Digital Tech Consulting

Blu-Ray Format Positioning as Next Generation DVD

Though video-compression solutions like MPEG-4-AVC (see page 1) will continue to optimize existing infrastructure for now, new hardware technologies will inevitably carry evolving applications through more dramatic advances. Just as the CD gave way to the DVD, Blu-Ray is one of several blue-laser technologies vying to become the next generation optical-disc format with the aim of providing greater capacity for storage-hungry high-definition programming.

While high-definition applications are a demand side drive, the effort to establish a new format is also a reaction by the consumer electronics industry market trends. Bargain-basement pricing of Chinese-made DVD players has manufacturers and retailers searching for profit margins in their best-selling product. A new format, controlled by major manufacturers, could help restore margins.

The effort toward the Blu-ray format was initiated with the founding of the Blu-ray Disc Founders (BDF) group in May 2002 by nine companies, Hitachi, LG, Matsushita, Pioneer, Philips, Samsung, Sharp, Sony and Thomson. Mitsubishi made it 10 when it joined the Founders group in late May. Blank media makers are JVC, Panasonic, Samsung, Sony and TDK.

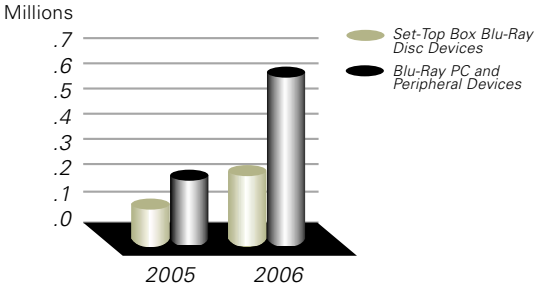
Current Blu-ray specifications call for a 36 Mbps transfer rate, but developers are working toward a 2x, 72 Mbps data transfer rate. A Blu-ray disc will be able to hold a two-hour-plus HD program (or 13 hours of standard definition content) on a rewritable 27 GB disc, with 50 and 100 GB discs already in the planning stages.The physical nature of the Blu-ray disc, however, is substantially different from the current DVD standard.

Blu-ray will also have a life as a media storage format in the PC market as its ability to store up to 27 GB of data on a disc. It's unlikely that it will get heavy use as a digital video format on the desktop but its storage capacity, alone, will be enough for PC suppliers to adopt it.

The final Blu-ray draft specification is due before the end of the year. An additional 18-to-24 months will be required to get to manufacturing and build the required support infra-structure of product introductions, software packaging, replication and distribution.

Although DTC estimates device shipments will reach nearly 5 million in 2008, the vast majority of those shipments are anticipated to come out of the PC and peripherals market.

Forecasted Blu-Ray Hardware Units Shipped:
(Set-top boxes and PC products)



Source: Digital Tech Consulting

DVD + R/RW Surges Ahead in Battle to Dominate Recordable DVD

(Note: This is an excerpt from DTC's recent white paper on recordable DVD. The full paper is available as a PDF at www.dtcreports.com).

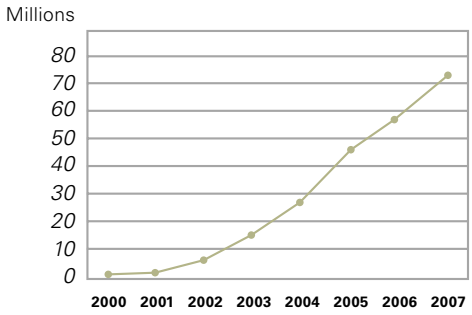
The read-only DVD format has quickly attained worldwide mass-market status since its 1996 introduction and DVD recording is poised for a similar, and potentially even more dramatic, trajectory today.

A significant element of read-only DVD success has been its interoperability between computers and consumer electron-ics (CE) devices. Though to date read-only DVD hasn't found as widespread use on the PC as it has with CE products, its adoption by high-end PC users, as well as home-video early adopters, was important in the technology's introduction. The dual DVD market helped to boost early drive sales and economies of scale (despite an early lack of content), allow-ing DVD to quickly reach price points critical for driving mass market-status in the CE market.

Recordable DVD stands to benefit even more from such characteristics since it affords greater use on PCs than did its read-only predecessor. And just as important, it is poised to be the next-generation VCR.

Recent research and analysis by DTC suggests that both stand-alone (CE) and PC-attached DVD recorders will be highly successful products, though the PC will drive the majority of early unit sales between 2003 and 2007. DTC forecasts combined unit shipments of recordable DVD will grow from more than 6 million in 2002 to 15 million in 2003, surpassing 70 million by 2007.

Recordable DVD Shipment Growth



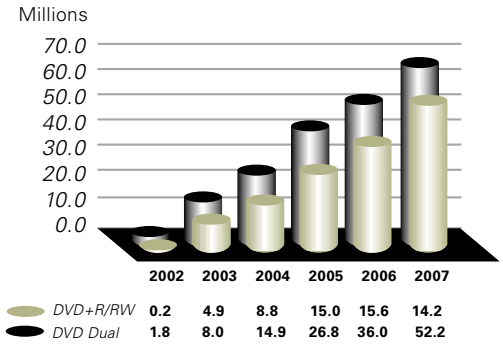
Source: Digital Tech Consulting

As with many new technologies, including recordable CD, recordable DVD is emerging from its infancy embroiled in controversy over the multiplicity of formats. Three general formats are currently available: DVD-RAM (predominate in early CE recorders, primarily in Japan from Toshiba and Matsushita); DVD-R/RW (favored by several large CE companies including Toshiba, Matsushita/Panasonic and Hitachi); and DVD+RW (favored by PC makers HP and Dell, as well as CE suppliers Sony and Philips). Though there has been little evidence that this has discouraged consumers to date, many fear a format war between these three will stifle the progress of the new category.

DTC's research suggests that such consumer backlash over multiple formats is unlikely, particularly since the introduction of new dual format drives in late 2002. In addition, the distinct CE and PC markets for recordable DVD can support more than one format – at least temporarily – with the thin layer of interoperability that does exist from the general compatibility with DVD-ROM. In the long run, however, it is likely that one format will dominate.

DVD+RW, though it is the newest of the three formats, has achieved an early and decisive dominance in PC-based shipments. Since DTC anticipates PCs will make up more than three-quarters of total recordable DVD drive shipments over the next five years, this gives added weight to the DVD+RW format. DVD+R/RW key supporters have positioned it well to leverage its early market share lead in the PC market. This is already evident in quarterly unit shipment trends. The table below illustrates the growing dominance of the DVD+RW format.

DVD + R/RW Shipments (All Devices)



Source: Digital Tech Consulting

Two main camps have emerged for recordable DVD formats R/RW and +R/RW. The third format, DVD-RAM, has been dominant in the small number of early recordable DVD sales prior to 2000. However, it is incompatible with the installed base of DVD-ROM, severely limiting its future.

The early market leader has been the "dash" format, -R/RW. This format is backed by the DVD Forum, an industry consortium of 212 companies including AOL-Time Warner, Sony, Toshiba, Nikon, NEC, Motorola, Iomega and IBM. Apple Computer, one of the first PC makers to embrace recordable DVD is also a member, and has shipped a large percentage of the first drives, though its overall PC market share is small. Seeking to minimize consumer confusion, as well as leverage DVD-RAM's early installed base, the DVD "dash" camp added compatibility and interoperability with the older DVD-RAM format in January 2003.

The "plus" format came to market in significant numbers during 2002 and has sold rapidly, particularly among new and aftermarket PC products. Supported by the DVD+RW Alliance with its 50-plus members including Microsoft, Dell, HP, Philips and Sony, +R/RW has made up an increasing portion of quarterly unit shipments during its approximate eighteen months of widespread availability.

For the most part the two formats are functionally alike in terms of technical features and pricing. Both support single side 4.7 GB DVDs and double side 9.4 GB DVDs, various editing features and are meant to function in both PC and set-top DVD players. Though +R/RW is more geared towards PC and editing features, and is considered to hold more promise in terms of product evolution, debate lingers about superiority in specific areas. DVD+R/RW products were more expensive during 2002 for both drives and media, but growing unit sales have essentially erased the gap.

ABOUT DTC

Digital Tech Consulting is a market research firm providing strategic information and analysis to help companies succeed in the consumer digital marketplace. To learn more about DTC and how our analysts might help your company, please visit us online at www.dtcreports.com or call 214.915.0930.

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