

Next-Generation Optical Media: Introduction

Next-generation DVDs, sometimes called “high definition” or “high density media,” have been under development for almost 10 years. Looking back at optical disc history, the killer application for CDs was music; for DVDs, it was video; and for the approaching next-generation optical disc, it will be high-definition video content and large-scale data storage. These products will use blue or violet lasers to burn smaller pits on narrower tracks, enabling the user to store massive amounts of data.

The FCC has mandated broadcasters to switch to digital broadcasts by 2009. This will establish the need for an optical disc to hold high-definition content exceeding the 4.7-GB (single-layer) or 8.5-GB (double-layer) capacity of today’s media. Current DVD capacities are still not enough to hold a high-definition full-length motion picture using today’s DVD MPEG-2 compression scheme. The new blue laser discs will support the same video compression schemes: H.264, MPEG-2, and VC-1.

None of the next-generation optical discs will work with existing DVD players or computer DVD ROM drives, but all of the new blue laser hardware will include laser systems that make them backward-compatible with CDs and DVDs.

We can see usage ranging from commercial applications like medical (complete patient records including high-resolution cat scans, x-rays, etc.) to massive data archives, utilizing jukeboxes, to provide several petabytes of storage.

Consumers can also benefit from this technology. With the FCC mandate directing all broadcasters to begin digital broadcasting in 2009, those consumers with HD TVs and systems to receive this content will be able to record, in true high definition and play it back on their HD TVs. It still remains to be seen if the broadcasters will broadcast pure 720p or 1080i content and allow it to be written to any disc format.

Blue Laser Technology FAQs

How many different types of read or write formats exist using blue laser technology? There are three primary formats. Please see the following list with links to white papers provided by representatives of the respective technologies.

UDO <http://www.plasmon.com/downloads/pdf/udofacts.pdf>

Blu-Ray Disc <http://www.blu-raydisc.com/Section-13628/Index.html>

HD DVD <http://www.toshiba.co.jp/tech/review/2005/01/index.htm>

Why is the industry proposing a change from red laser to blue laser technology? The advantage of blue laser technology is a much narrower wavelength of laser light that can create smaller pits and tracks on the disc resulting in higher capacities than existing DVD technology.

What advantage does each format offer?

For Video

BD: The Blu-ray Disc (BD) format's 0.1 mm read-through cover layer allows the use of a higher numerical aperture 0.85 objective lens that can read and write the smallest microscopic features on a BD disc surface. This yields a capacity of 25GB per layer – 25GB for single layer, 50GB for dual layer, etc. – that provides more space for storing more high definition audio/video programs and “bonus features” that have become increasingly common on standard definition DVDs. Many, if not most of today's DVD titles now include more than one dual layer DVD-9 disc, indicating that the content industry outgrew the original DVD-5 disc more quickly than expected. We expect the same trend is likely in high definition content releases of the future.

HD: HD DVD Video provides excellent quality high definition pictures using the most advanced compression scheme together with advanced navigation system including interactive features and Internet connectivity.

For Data

HD: HD DVD family provides flexible capacity selection corresponding to the content providers' needs including red laser DVD-ROM. Recordable media has family of ReWritable and Recordable discs. ReWritable disc has 20GB capacity and Recordable media employing dye media for recording layer has 15GB/30GB(dual layer: tentative) capacity; Because it can utilize the spin coating method already used in DVD recordable production, low-cost disc manufacturing can be realized. (Existing DVD equipment can be modified to produce HD DVD discs.

BD: The high capacity that Blu-ray Disc offers for HD video can also be applied for data storage applications. The BD format maintains consistency between replicated and writable versions, so a BD-ROM, BD-RE and write-once BD-R formats all offer the identical storage capacities in both single and dual layer forms. Blu-ray is backward compatible with DVD-ROM.

How does your technology support consumer or commercial applications?

BD: Blu-ray Disc's most significant application is the large scale publication and distribution of high definition motion pictures, games, music and other audio/visual content. As with the CD for music and DVD for standard definition AV, the next generation optical format enables the highest possible quality for HD visual content as well as a convenient way to store and reproduce a large quantity of material without requiring the inconvenience of spanning it across multiple discs. Rewritable and write-once versions of BD allow both consumer and commercial users to store vast quantities of AV content, digital images, compressed music files and other data.

HD: HD DVD will be convenient for consumer and commercial applications and can provide a wide range of capacity to be used to store content. Also, advanced video features by HD DVD-Video will provide a flexible and productive application environment. Disc creation tools, manufacturing lines, and verification systems will be ready this year. HD DVD technology uses similar technology to DVD, therefore compatibility with DVD is attainable.

How soon will each format reach the market?

HD: By the end of 2005.

BD: The rewritable version of the Blu-ray Disc format, BD-RE, is already shipping in Japan for use in set top HDTV recorders. The BD-ROM and recordable formats are likely to ship in other regions of the world by early 2006.

Will players and recorders be available supporting your technology?

BD: Yes, many manufacturers in the Blu-ray Disc group have shown prototypes of both HDTV set top video recorder/players as well as recordable computer drives. Users should have a wide variety of products to choose from.

HD: Yes, we expect to launch products in early 2006.

Will hardware be backward compatible to read today's optical media (CD-ROM, CD-R, DVD-ROM, DVD±R)?

HD: Yes, backward compatibility is established.

BD: Although the decision to support legacy formats is up to individual manufacturers, every known prototype Blu-ray Disc product shown so far has specified playback compatibility and, where appropriate, recording compatibility with DVD formats. Some have also specified CD format compatibility as well.

How are prices expected to compare with present DVD media and hardware?

BD: Each format group is comprised of many companies that manufacture a very wide variety of products. The format groups themselves cannot specify or even estimate specific prices for products. However, it's likely that next generation players and recorders will follow a similar path as previous format products such as DVD players and recorders.

HD: We expect comparable prices with DVD hardware and media to be achieved in the future.

Which companies support each format?

HD: See link for current list of supporting companies:

<http://www.hddvdprg.com/about/member.html>

BD: See link for current list of supporting companies:

www.blu-raydisc.com/Section-13469/Index.html

For more information, please contact : info@osta.org

**Next Generation Optical Media:
Blue Laser Technology**

	DVD	Blu-Ray Disc	HD DVD
Read-through layer thickness:	0.6 mm	0.1 mm	0.6 mm
Laser:	red	blue	blue
Wavelength	650 nm	405 nm	405 nm
Numerical aperture:	.65	.85	.65
Capacity:			
Recordable			
single layer	4.7GB	25 GB SL ROM, RE, R	15 GB SL ROM
dual layer	8.5GB	50 GB DL ROM, RE, R	30 GB DL ROM (tentative)
Rewritable:			
single layer	4.7GB	25 GB SL ROM, RE, R	20 GB Writable
dual layer	8.5GB	50 GB DL ROM, RE, R	
Data transfer speed:	10.08Mbps	40 Mbps	36 Mbps
Video encoding:	MPEG-2	MPEG 2, MPEG 4 AVC, VC-1	MPEG2/MPEG4 AVC/VC1
Cartridge:	no	No	No
Speciifcations written by:	DVD Forum	Blu-ray Disc Association	DVD Forum