

BLU-RAY VS HD DVD: STATE OF THE DIVISION

By Ryan Block



Well, as far as HD DVD vs. Blu-ray goes, it looks like we've pretty much passed the point of no return now; with each passing day it seems less and less likely that a compromise will be reached on a next-generation format. The ongoing peace talks between the two camps, which have been on-again, off-again for months now, seem to have finally dissolved. It's disappointing, but however you feel about the fact that the HD DVD and Blu-ray factions squandered countless chances to make it right and come together, it looks like in just a few short months they're going to be duking it out *mano a mano* right in our livingrooms. There may not be a lot we can do to fight back — apart from refusing to adopt either format out of sheer spite of their pigheadedness — but no matter what we might as well at least arm ourselves with the knowledge necessary to understand the nature of the situation at hand.

Here's the background:

Philips's development of the Laserdisc in 1969 yielded many of the technologies Sony carried over and adopted when they partnered with Philips to create a little something called the CD way back in '79. Both companies were hard at work together once again in the early 1990s on a new high-density disc called the MultiMedia Compact Disc (MMCD—original name, guys), but their format was eventually more or less abandoned in favor of Toshiba's competing Super Density Disc (SD), which had the vast majority of backers at the time, such as Hitachi, Matsushita (Panasonic), Mitsubishi, Pioneer, Thomson, and Time Warner.

The two factions cut a deal, brokered by IBM president Lou Gerstner, on a new format: DVD. Toshiba wound up on top after the dust settled in 1995/1996, and Sony and Philips, who weren't cut in on the standard (and royalties) nearly as much as they'd have liked, immediately started work on a next generation system. The Professional Disc for DATA (aka PDD or ProDATA), which was based on an optical disc system Sony had already been developing in the side, would eventually become the Blu-ray disc. Toshiba, not to be outdone by the pair, also started work on a next generation system, the Advanced Optical Disc, which eventually evolved into the HD DVD. After thirty-five years of optical audio/video disc development we're back where we were years ago: two money-grubbing factions fighting each other and threatening to wreak havoc on the consumer electronics industry. Apparently history really does repeat itself.

So here's the technical nitty gritty before we drop the graphs and charts on you. Both systems use the same kind of 405nm wavelength blue-violet laser, but their optics differ in two ways. Since the Blu-ray disc has a tighter track pitch (the single thread of data that spirals from the inside of the disc all the way out—think grooves on a 12-inch vinyl single vs. an Elvis Costello full-length album), it can hold more pits (those microscopic 0s and 1s) on the same size disc as HD DVD even with a laser of the same wavelength.

The differing track pitch of the Blu-ray disc makes its pickup apertures differ, however - 0.65 for HD DVD vs. 0.85 for Blu-ray - thus also making the two pickups technically incompatible despite using

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lasers of the same type. HD DVD discs also have a different surface layer (the clear plastic layer on the surface of the data - what you get fingerprints and scratches on) from Blu-ray discs. HD DVD use a 0.6 mm-thick surface layer, the same as DVD, while Blu-ray has a much smaller 0.1mm layer to help enable the laser to focus with that 0.85 aperture.

Herein lays the issues associated with the higher cost of Blu-ray discs. This thinner surface layer is what makes the discs cost more; because Blu-ray discs do not share the same surface layer thickness of DVDs, costly production facilities must be modified or replaced in order to produce the discs. A special hard coating must also be applied to Blu-ray discs, so their surface is sufficiently resilient enough to protect the data a mere 0.1mm beneath - this also drives the cost up. The added benefit of keeping the data layer closer to the surface, however, is more room for extra layers.

Still with us? No? Blu-ray discs are more expensive, but hold more data - there, that's all. So now that you know why Blu-ray discs cost more and why Sony/Philips and Toshiba are all hashing on one another so much, we can get to the really important stuff: the numbers, and who's supporting who.

Capacity			
Blu-Ray		HD DVD	
ROM single layer:	23.3 / 25GB	Single layer:	15GB
ROM dual layer:	46.6 / 50GB	Dual layer:	30GB
RW single layer:	23.3 / 25 / 27GB	-	-
RW dual layer:	46.6 / 50 / 54GB	-	-
Highest test:	100GB	Highest test:	45GB
Theoretical limit:	200GB	Theoretical limit:	60GB

Codexs	
Blu-Ray	HD DVD
MPEG-2	MPEG-2
Microsoft Video Codec 1 (aka VC1, WMV HD, etc.)	Microsoft Video Codec 1 (aka VC1, WMV HD, etc.)
H.264 / MPEG-4 AVC	H.264 / MPEG-4 AVC

Security	
Blu-Ray	HD DVD
Mandatory HDCP encrypted output	Mandatory HDCP encrypted output (for HD)
ROM-Mark watermarking technology	Volume identifier (physical layer)
BD dynamic crypto (physical layer)	Advanced Access Content System (AACs)
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Studios (movie and game) listed as supporting members	
Blu-Ray	HD DVD
20th Century Fox	Buena Vista Home Entertainment
Buena Vista Home Entertainment	New Line Cinema
Electronic Arts	Paramount Pictures
MGM Studios	The Walt Disney Company
Paramount Pictures	Universal Studios
Sony Pictures Entertainment	Warner Bros.

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The Walt Disney Company Vivendi Universal Games Warner Bros.	
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Format founders	
Blu-Ray	HD DVD
Sony Corporation Royal Philips Electronics	Toshiba Corporation Hitachi Corporation

Companies listed as Members of the Board or Managing Members	
Blu-Ray	HD DVD
Apple Computer Corp. Dell, Inc. Hewlett Packard Company Hitachi, Ltd. LG Electronics Inc. Mitsubishi Electric Corporation Panasonic (Matsushita Electric) Pioneer Corporation Royal Philips Electronics Samsung Electronics Co., Ltd. Sharp Corporation Sony Corporation TDK Corporation Thomson Twentieth Century Fox Walt Disney Pictures and Television	Memory-Tech Corporation NEC Corporation Sanyo Electric Co.

Companies listed as Members, Associate Members, or Contributors (may include duplicates and/or subsidiaries, major companies are bolded, major companies common to both camps are also italicized)	
Blu-Ray	HD DVD
3oh!5 Creative, Inc. Adobe Systems Almedio Inc. Alpine Electronics Inc. AMC Co. Ltd. Anwell Technologies USA Aplix Corporation ArcSoft Inc. Asahi Kasei Microsystems Co. ashampoo GmbH & Co. KG ATI Technologies Inc. AudioDev AB B.H.A. Corporation Bandai Visual Co. Ltd. BASF AG BenQ Corporation Broadcom Corporation Canon Inc.	Acer Inc. Almedio Inc. Alpine Electronics, Inc. Altech Ads Co. Arcsoft, Inc B.H.A Corporation Bandai Visual Co. Canon Inc. Cyberlink Corp. D&M Holdings Inc. Daikin Industries Daiko.Co.,Ltd. Digion, Inc. Digital Site Corporation Digital Theater Systems Disc Labo Corp. Diskware Co. Ebistrade, Inc.

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Ciba Specialty Chemicals Inc.	Interactive Gmbh
CMC Magnetics Corporation	Entertainment Network Inc.
Coding Technologies GmbH	Expert Magnetics Corp.
Conexant Systems Inc.	Finepack . Co.,Ltd
Cryptography Research Inc.	Fuji Photo Film Co.
CyberLink Corp.	Fuji Seiki Co.
D&M holdings, Inc.	Funai Electric Co.
Daewoo Electronics Corporation	The High-Defition Marketing Company
Daikin Industries	Hitachi Corp.
DATARIUS Technologies GmbH	Hitachi Maxell
Degussa	Hoei Sangyo Co.
Deluxe Media Services Inc.	Imagica Corp.
Digital Theater Systems Inc.	Imation Corp.
Dolby Laboratories Inc.	Interchannel
Eclipse Data Technologies	Intervideo, Inc.
Electronic Arts Inc.	Itri
Elpida Memory, Inc.	Jp Co., Ltd
ESS Technology Inc.	Justsystem Corporation
Expert Magnetics Corp.	Kadokawa Holdings, Inc.
Fuji Photo Film Co.	Kaleidescape, Inc.
Funai Electric Co.	Kenwood Corporation
Horizon Semiconductor	Kinyosha Printing Co.
IMAGICA Corp.	Kitano Co.
Imation Corp.	Konica Minolta Opto, Inc.
Infomedia Inc.	M2 Engineering
Intersil Corporation	Mcray Corporation
InterVideo Inc.	Memory-Tech Corporation
Kadokawa Holdings Inc.	Mitomo Co., Ltd
Kaleidescape, Inc.	Mitsubishi Kagaku Media Co. / Verbatim
Kenwood Corporation	Mitsui Chemicals, Inc.
Konica Minolta Opto, Inc.	Moser Baer India Ltd
Laser Pacific Media Corp.	Nec Corporation
Lead Data Inc.	Nec Electronics Corporation
LEADER ELECTRONICS CORP	Nec Fielding
Linn Products Ltd.	Nero
LINTEC Corporation	Nichia Corporation
LITE-ON IT Corporation	Nihonvtr Inc.
LSI Logic	Nikkatsu Corporation
M2 Engineering AB	Omnibus Japan
Maxim Integrated Products	Onken Corporation
MediaTek Inc.	Onkyo Corporation
Memorex Products Inc.	Paramount Home Entertainment
Meridian Audio Ltd.	Pico House Co.,Ltd
Mitsubishi Kagaku Media Co. / Verbatim	Pixela Corporation
Mitsui Chemicals Inc.	Pony Canyon Inc.
Mitsumi Electric Co.	Ponycanyon Enterprise Inc.
Moser Baer India Limited	Prodisc Technology Inc.
MX Entertainment	Pryaid Records Inc.
Nan Ya Plastics Corporation	Pulstec Industrial Co.
Nero	Q-Tec,Inc.
Newtech Infosystems Inc.	Ricoh Co.
NEXAPM Systems Technology Inc.	Ritek Corporation
Nightjar LLC	Sanken Media Product Co.
Nikkatsu Corporation	Sanyo Electric Co.

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NTT Electronics Corporation nVidia Corporation Onkyo Corporation Ono Sokki Co. OPT Corporation Optodisc Technology Corporation Pixela Corporation PoINT Software & Systems GmbH PowerFile Prodisc Technology Inc. Pulstec Industrial Co. Ricoh Co. Ritek Corporation Sanyo Electric Co. SDI Media America ShibaSoku Co. Ltd. Shinano Kenshi Co. Ltd. Sigma Designs Inc. Singulus Technologies Sonic Solutions Sonopress Sony BMG Music Entertainment ST Microelectronics STEAG ETA-OPTIK GmbH Sun Microsystems, Inc. Sunext Taiyo Yuden Co., Tao Group Limited Targray Technology International Inc. Teac Corporation Teijin Chemicals Ltd. Toei Video Company Ltd. Toho Company Toppan Printing Co. TOPTICA Photonics AG Ulead Systems Inc. UmeDisc Ltd. Unaxis Balzer AG Universal (inc. Music , Vivendi Games, Pictures) VDL-ODMS Victor Company of Japan (JVC) Vidiom Systems Corporation Visionare Corporation Yamaha Corporation Yokogawa Electric Corporation ZOOtech Ltd. Zoran Corporation	Shibaura Mechatronics Corporation Sonic Solutions Sumitomo Heavy Industries. Ltd Super Vision, Inc. Taiyo Yuden Co. Teac Corporation Teijin Chemicals Ltd. Toei Video Co. Toho Company, Limited. Tokyo Laboratory Ltd. Toppan Printing Co. Toshiba Corporation Toshiba Digital Frontiers Inc. Toshiba Entertainment Inc. Toshiba Samsung Storage Technology Corporation Toshiba-Emi Limited Toyo Recording Co. Transmix Co. Trendy Corporation Tri-M, Inc. Ulead Systems, Inc. Unaxis Balzers Ltd. Universal (inc. Music , Vivendi Games, Pictures) U-Tech Media Corp. Vap Inc. Video Tech Co.,Ltd. Visionare Corporation Warner Home Video Inc.
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Other interesting facts:

- The Nichi Corporation, who holds the design patents to the Blu-ray's laser system, sits as an associate member of the HD DVD Promotion Group.

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- Even though Apple sits on the Blu-ray Board of Directors, its DVD Studio Pro software supports authoring HD DVD media.
- Blu-ray, unlike HD DVD, requires a hard coating on its discs because it's 0.5m closer to the surface. The polymer coating it uses, called Durabis, was developed by TDK and is supposedly extremely resilient and fingerprint resistant.
- The Java platform is mandatory on Blu-ray as it's the standard for menus/multimedia (i.e. all Blu-ray systems must support JVM)
- Though Microsoft has not officially sided with either format, it has a number of long-standing IP cross-licensing deals with Toshiba. HD DVD systems will run Windows CE; the standard is currently the only next-generation optical standard with announced support in Longhorn, and an HD DVD version of the Xbox 360 is rumored for the future.
- The first consumer Blu-ray device in the US market is expected to be the PlayStation 3.