

Next-Generation DVD: High-Def / High-Density



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High-Def DVD

- **The HD Problem**
 - Where's the Delivery Format?
- **New DVD Formats**
 - Layers and Sides: DL, DualDisc
- **Higher Density – HD DVD / Blu-ray**
 - Formats and Issues
- **Better Compression**
 - MPEG-4 / DivX & Nero
 - WMV HD DVD / Sonic DVD Producer HD
- **Next-Gen Authoring**
 - Interactivity, Scripting



High-Def is Here

HDTV for Consumer Electronics



- **Consumer Electronics Association (CEA)**
 - More than 1.35M LCD units 2004
 - Cumulative DTV sales 14.3M units, \$23B
 - Integrated sets and monitors at least 480p ATSC terrestrial digital broadcasts
 - DTV unit sales forecast
 - '04 - '08 – **6.97M - 10.77M - 16.77M - 23.25M - 27.05M**
- **Mass Merchandisers: Best Buy, Wal-Mart**
- **PC to CE: Dell, Gateway, Hewlett-Packard**

Shoot HD – HDV Format

HDV – Affordable HD on MiniDV Tape

- **HDV Format – Sony & JVC**
 - www.hdv-info.org
- **Video: MPEG-2 (MP@H-14), 16:9, NTSC / PAL**
 - **720p (1280 x 720) – 19 Mbps**
 - 60p, 30p, 50p, 25p
 - **1080i (1440 x 1080) – 25 Mbps**
 - [vs 1920 display, DVCPRO HD 1280]
 - 60i, 50i
- **Audio: MPEG1 Layer II**
 - 48 kHz, 16-bit – Stereo at 384 kbps
- **Transport**
 - MPEG-2-TS (Transport Stream) over FireWire

HDV



Shoot HD – HDV Cameras

Affordable HD Acquisition

- **JVC – JY-HD10U – \$2900 – 6/03**
 - Single-chip
 - DV, SD progressive, HDV (720/30p)
- **Sony – HVR-Z1U Pro – \$4900 – 11/04**
 - 3-chip – DV, DVCAM, HDV 1080
 - SD or HD; 60i or 50i; 30, 25, 24 fps
 - “Cinema like” (25F/30F/24F)
- **Sony – HVR-M10U HDV VCR – \$3,700**
- **Sony - HDR-FX1 Handycam camcorder - \$3700**
 - HDV 1080i



JVC JY-HD10U

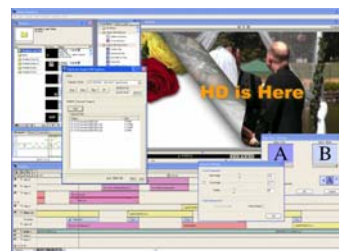


Sony HVR-Z1U

Edit HD – On the Desktop

Affordable HD Editing

- **Software with Native Editing**
 - Hardware Capture / Acceleration
- **Native MPEG-2**
 - HDV – 19, 25 Mbps
 - Pinnacle Liquid Edition
- **Native DVCPRO HD**
 - Panasonic Varicam – 100 Mbps
 - Final Cut Pro HD, Avid Xpress Pro HD
- **Intermediate Format**
 - Trancode – Lightly compressed
 - CineForm Aspect HD – 100 Mbps
 - Adobe Premiere Pro, Sony Vegas
- **Uncompressed ...**



Deliver HD – Where’s the Format?

Need Ubiquitous HD Delivery Format



- **HD Tape?**
 - D-VHS recorders for SD and HD digital TV broadcasts
 - Prerecorded D-Theater HD movies
- **HD Disc?**
 - (WMV HD on PC)
 - Coming soon ...
- **Copy Protection issues - AAC3**
 - Prerecorded content / Record broadcast



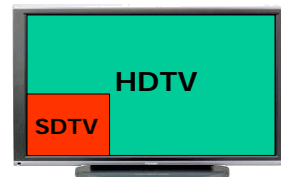
HD Demands More Capacity

Need to Find 6X Improvement

- **HDTV has six times more picture information than Standard Definition TV (NTSC or PAL)**

1920 x 1080 x 30 = 62 million pixels/second →

720 x 480 x 30 = 10 million pixels/second →



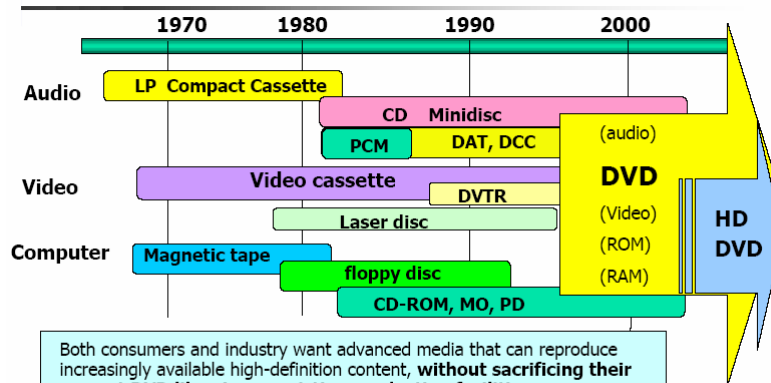
- **Need 6 X improvement for “HD”**
 - High-Density – More physical bits – Storage capacity
 - High-Definition – Better compression – Data rate

“High Def” Requirements

- **High-Density Storage**
 - 4 to 6 X capacity (15 to 30 GB per layer)
 - 2 to 3 X data rates (25 to 36 Mbps)
 - DVD form factor – Red -> Blue laser
- **High-Definition Video**
 - 2-hour HD movie – 1280x720, 1920x1080
 - Progressive, widescreen (16:9)
 - MPEG-2 HD, MPEG-4 AVC, VC-1 (WMV 9)
- **High-Definition Audio**
 - Dolby Digital+ (lossy), MLP (lossless), DTS-HD
- **Advanced Interactivity**
 - Scripting / Java programming, Internet connectivity



Trends in Media: HD DVD



Both consumers and industry want advanced media that can reproduce increasingly available high-definition content, **without sacrificing their current DVD libraries or existing production facilities.**

HD DVD offers a seamless transition.
TOSHIBA

End of format stability: DV for acquisition, DVD for delivery
Consumer and professional, Set-top to desktop, CE to PC

DVD Formats: Mastered Discs

Multiple Layers and Sides

- **Replicated DVD Formats**
 - DVD-5 - 4.70 BB - Single-sided
 - DVD-9 - 8.54 BB - Dual-layer
- **Super Audio CD (SACD)**
 - Sony and Philips, for audiophiles
 - Dual-layer: CD audio + HD audio
- **Dual Disc – End 04**
 - Double-sided: CD album, 2nd DVD side
 - DVD-Audio w/ album in high quality sound
 - Plays anywhere: Plus DVD extras
- **Double-Layer (DL) Recordable**
 - DVD+R DL shipped 2H 2004; 8.5 GB

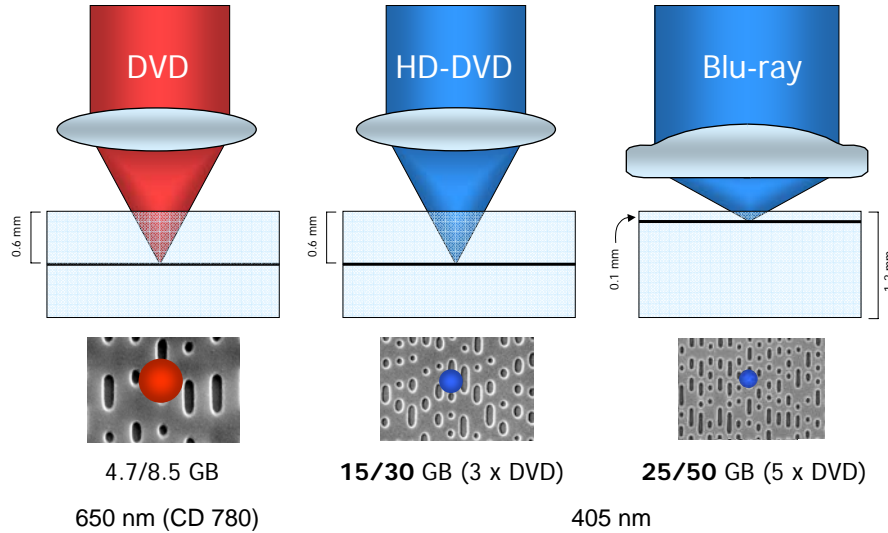


Path to High-Capacity DVD

- **Backward Compatible**
 - Same disc form factor: CD + DVD + HD
 - Floppy 1 MB -> CD 650 MB -> DVD 4.5 GB (7X)
- **Higher Capacity – Blue Laser**
 - 2 hour HD movie per side (w/ layers)
 - Blue-violet laser: shorter wavelength
- **Better Compression**
 - Video: MPEG-2, MPEG-4 AVC, WMV (VC-1)
 - Audio: Dolby Digital+, DTS-HD, MLP lossless ...
- **Next-Gen Product**
 - Playback and Record: Unlike original DVD
 - Next-Gen Authoring: Video + Interactive (Java)

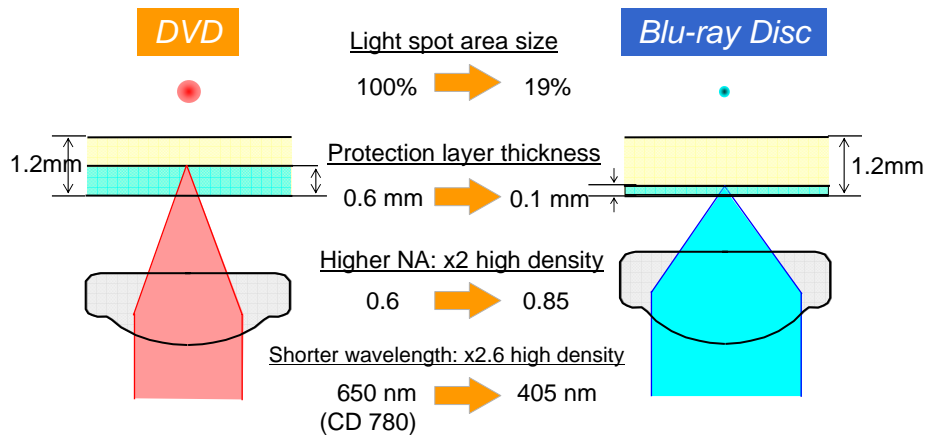


Increase Density: Red to Blue Laser



Blu-ray Laser: Comparison to DVD

Beam spot area size is successfully reduced to one fifth that of DVD by adopting a 0.85 high NA lens and a 405 nm blue-violet laser.



High-Def DVD Formats

- **HD DVD**

- 3X DVD – 15 / 30 GB SL/DL
- DVD Forum – AOD (Advanced Optical Disc)
Toshiba, NEC – Memory-Tech, Sanyo, Thompson
- Less aggressive, closer to DVD manufacturing



- **Blu-ray Disc (BD)**

- 5X DVD – 25 / 50 GB SL/DL
- BD Assoc (100+): Sony, Panasonic (Matsushita)
CE – Hitachi, LG Electronics, Mitsubishi, Pioneer,
Philips, Samsung, Sharp, Thomson
- PC – Apple, Dell, Hewlett-Packard
- Studios – Fox, Disney; Media – TDK
- More capacity: 2/3 more



HD DVD

- **References**

- DVD Forum – www.dvdforum.com
- HD DVD Promotion Group – www.hddvdprg.com

- **HD DVD Format**

- HD DVD-ROM (Read-Only)
 - Single-sided – 15 GB (single-layer) – 30 GB (dual-layer)
 - Double-sided – 30 GB (single-layer) – 60 GB (dual-layer)
- HD DVD-R (Recordable)
 - Single-sided – 15 GB (single-layer)
 - Double-sided – 30 GB (single-layer)
- HD DVD-RW (Rewritable)
 - Single-sided – 20 GB (single-layer) - 32GB (dual-layer)
* under development
 - Double-sided – 40 GB (single-layer)



Blu-ray Disc (BD)

- **References**

- Blu-ray Disc Association – www.blu-raydisc.com
- Blu-ray Disc License Site – www.blu-raydisc.info
- White Papers – www.blu-raydisc.com/Section-13628

- **BD Format**

- BD-ROM, BD-R, BD-RE
- 23.305 and 25.025 GB/layer (27.02 reserved)
- Dual layer 46.61 and 50.05 GB (54.04 reserved)
- User data transfer rate: 53.948 Mbit/s (Movies)
(vs 10.08 Mbps for DVD)
 - 5X DVD data rate at double the rotation rate



Another Format War

- **Studio Support (DRM)**

- HD DVD: / Paramount (Viacom – CBS, MTV)
Warner Bros & New Line (Time Warner – HBO)
Universal (GE – NBC) – not exclusive
- Blu-ray: Sony / Columbia & MGM
Disney & Buena Vista; EA, Vivendi Univ. Games



- **Products Coming to Market**

- Extensive test manufacturing
- BD on market: Consumer and ProData

- **VHS vs. Beta Again, Not DVD +/-**

- Unlike DVD, Need compatible burner and player
- Maybe multi-format players (vs. recorders)?



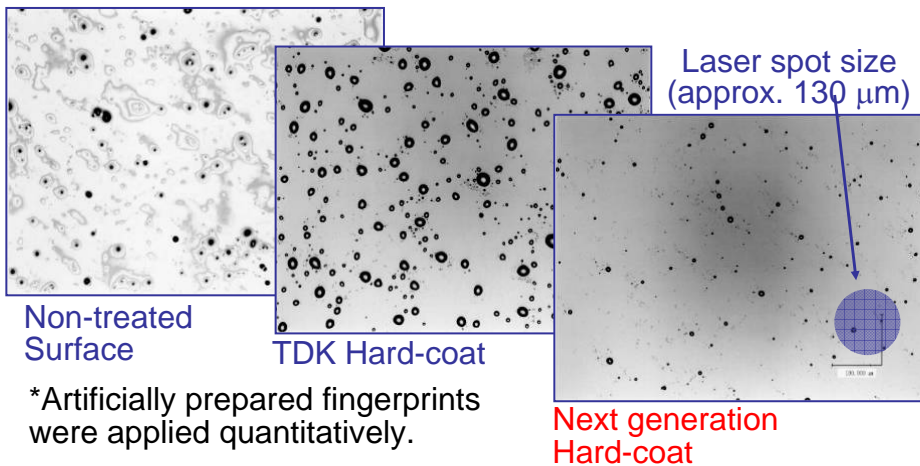
Copy Protection – AACS

- **Advanced Access Content System (AACS)**
 - Manage content stored on next generation of prerecorded and recorded optical media, for consumer use with PCs and CE devices
 - Home network, media servers, authorized media, portable devices
 - www.aacsla.com
- **Founders (8 companies)**
 - IBM, Intel, Microsoft, Panasonic (Matsushita)
Sony, Toshiba, Disney, Warner Bros.
- **Main Features – CSS + CPRM**
 - AES 128 bit encryption
 - Enhanced Drive Authentication – Device key for drive
 - Disc manufacturer ID bound to key – Authenticate original
 - Improved Media Key Block to make precise key revocation
 - Network connectivity – Unlock content by Internet
- **HD DVD will adopt, BD might adopt**

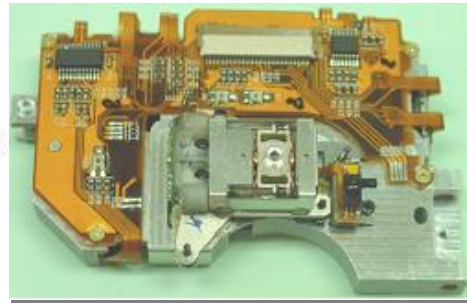
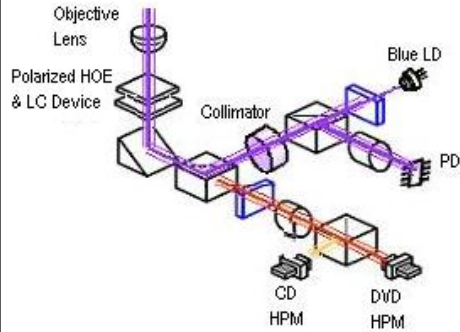


Fingerprint Resistance

Hard Coat for BD-RE/R Bare Disc (no caddy)



Compatibility with Red-Laser DVD BD/DVD/CD Compatible Pick Up



LG Electronics

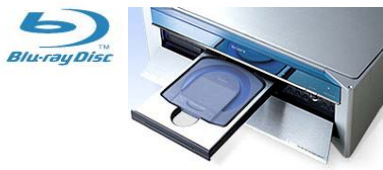
Single aspherical objective lens
Polarized HOE and LC device are located under the objective lens.

Professional Blu-ray Products

Sony XDCAM
Professional Disc Camcorder



Sony BDZ-S77
Blu-ray Disc Recorder



Sony ProData:
Professional Disc for Data
23GB, 11 Mbps,
\$2400 drive, \$45 media



BD-ROM Replication Line



- Over half million SL discs produced in Japan
- Over 100,000 DL discs produced in Japan

HD DVD Manufacturing Lines

- All HD DVD disc manufacturing lines installed from this year by disc replicators will be HD DVD/DVD compatible line
- Installation of approx. 100 HD DVD/DVD compatible lines is expected in 2005.
- Six HD DVD/DVD compatible production lines are now in daily operation at Memory-Tech facilities
- Current manufacturing cycle time
 - 30GB HD DVD dual-layer disc: **2.8 seconds CONFIRMED**
A 2.6-second production cycle will be achieved by May 2005
 - DVD dual layer cycle time: **2.6 seconds**
- Current manufacturing yield
 - 30GB HD DVD dual-layer disc: **92–94% CONFIRMED**
 - DVD disc: 95% (1997: 80%)

Manufacturing efficiency already equivalent to that of Standard DVD!

HD DVD Hardware Releases 2005

Toshiba: HD DVD player and notebook PC with HD DVD drive, both compatible with DVDs, will be launched in 4Q 2005



SANYO: HD DVD player compatible with DVD in 4Q 2005 (HD DVD recorder in autumn 2006)

Thomson: HD DVD player compatible with DVD in 2005






NEC: HD DVD ROM drives capable of playing back DVDs and CDs, will be delivered in September 2005.

HD DVD RW drives will be also delivered within 2005.

- Information based on each company's official announcement
- It may start from USA and Japan first because of the each market situation

HD DVD Titles Release Plans

Studios have Announced a Broad Range of New Hit Releases and Catalogue Titles on HD DVD Starting from 4Q 2005 (U.S.A.)

	New/Recent Releases	Catalogue Titles	No. of Titles Announced
 Paramount	THE MANCHURIAN CANDIDATE SPONGEBOB SQUIREPANTS ELIXZABETH TOWN and others	Forrest Gump Braveheart Mission IMPOSSIBLE 2 and others	20
 Universal	Van Helsing The Bourne Supremacy The Chronicles of Riddick	Apollo 13 U-571 12 Monkeys, and others	16
 Warner Bros. including New Line Cinema and HBO	Ocean's Twelve The Polar Express The Phantom of the Opera and others	Matrix Harry Potter series Se7en, Blade, Rush Hour, Austin Powers, The Sopranos and others	53

Total of 89 Titles!

More High-Def DVD Formats

- **EVD – Enhanced Versatile Disk – China**
 - Red laser DVD – 9 & 16 GB DL (25 & 48 GB blue later)
 - MPEG-2 video (was On2 VP5/6), Beijing E-world group
 - Coding Technologies, EAC 2.0 Enhanced Audio Codec
 - www.chinatechnews.com
- **FVD – Forward Versatile Disc - Taiwan**
 - Red laser – 5.4 & 9.8 GB SS/DL (720) to 6 & 11 GB
 - Next generation over 15 GB (1080i)
 - Microsoft WM Video 9 and WMA 9 Pro
 - Royalty 10¢ vs \$2.50 MPEG-2, 25¢ MPEG-4
 - Sigma Designs EM8620L media processor
 - retail ~ US \$149 in Taiwan and \$121 in China
 - Taiwan Industrial Technical Research Institute (ITRI)
 - www.itri.org.tw/eng
 - Sonic to support in burn engine



Future High-Def DVD Formats

- **VMD – Versatile MultiLayer Disc**
 - New Medium Enterprises; MPEG-2, 1080i/p HD
 - Red laser – Multiple layers – 5 GB each – 20 - 40 GB
- **More Variants**
 - Hybrid Dual-Layer: HD DVD + DVD
 - More Layers (BD): Quad-layer
- **Optware – HVD – Holographic Versatile Disc**
 - HVD Alliance, Japan – Fuji, Konica Minolta, Mitsubishi
 - Collinear holographic recording – double beam
 - Capacity 300 GB to 3.9 terabytes on single DVD
 - (1 TB = 200X DVD; Transfer 1 Gb/s = 40 X)
- **InPhase – Tapestry Holographic Drive**
 - Maxell; 300 GB to 1.6 TB – OEM 2006



HD Compression

- **Better Compression**
 - More HD & SD content on HD discs
 - Fit HD content on current DVD discs
- **Codec Improvements**
 - Current DVD: MPEG-2 at ~ 6-8 Mbps
 - Advanced codecs: WMV, MPEG-4
 - Scalable from HD to portable
 - HD at DVD Rates
 - SD over broadband in 1 - 2 Mbps
 - HD with surround sound in ~ 5 Mbps
 - Mass Storage
 - Fit 2 movies on CD, 15 on a DVD
 - 133 hours on 60 GB drive vs 5 hours of DV



MPEG-4 Developments

- **MPEG-4 - 1999**
 - Error resilience features
 - Clear improvement for medium bit rate coding (384 to 768 Kbps)
 - MPEG Industry Forum - www.mpegif.org
- **MPEG-4 AVC - 2003**
 - AVC - Advanced Video Coding
 - ITU H.264 / MPEG-4 part 10
 - Joint Video Team (JVT)
 - Substantially higher video quality, higher complexity
- **Apple QuickTime 6 (7/02)**
 - Mainstream MPEG-4, AAC audio
 - MPEG-2 playback separate component
 - www.apple.com/mpeg4



DivX – MPEG-4 on DVD

- **DivX Networks**



- Core DivX video codec over 120 million users
 - HD, VOD, DRM; DivX Certification; Networking (v6 3/04, HD)
- DVD quality at 10X compression of MPEG-2

- **CE Devices**

- 20 million DivX Certified DVD players ship by end 04
 - I-O Data AVeL LinkPlayer 2 – DivX HD DVD Player – \$249
- 2005 – HD DVD players, DVD recorders, DVRs, digital cameras, portable media players, set-top boxes, network-connected devices



Nero Digital – MPEG-4 on DVD

- **Nero Digital**

- Standards: MPEG-4 Simple & Advanced profiles, AAC
- DVD quality in 20% of the space

- **CE Devices**



- Siemssen SCO 5000ND DVD player – 12/04
- Copy Protection: CPRM (-), VCPS (+), DCTP/IP
- DRM: Proprietary + Standards (OMA, Coral)
- DVD-like: 2 audio streams, subtitles, chapters
- HDTV profile next generation



Windows Media 9 Series



- **Windows Media 9 (9/02, 1/03)**
 - HD video, 5.1-channel surround sound
 - Video 15 – 50% better WMV 8,
 - 3X MPEG-2, 2X MPEG-4
 - Audio 20% better than WMA 8
 - Perceptually lossless at 5:1
 - www.microsoft.com/windowsmedia
- **Windows Media Player 10 (end 2004)**
 - Windows Media Services, Encoder, SDK
 - Hardware decoders: WMA, WMV
 - Advanced Profile codec - 2004
 - Interlaced, broadcast and wireless
- **SMPTE Standardization (VC-1)**
 - Adopted by next-gen DVD formats



Windows Media in Products



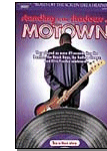
- **CE Devices – Sigma Design processors**
 - Support Windows Media Audio and Video 9
- **Networked DVD Media Players**
 - KiSS Technology DP-600 - Europe ~ \$299
 - I-O Data LinkPlayer2, Japan – WMV HD
 - Buffalo Link Theater, Japan
 - LITE-ON IT OEM DVD player
- **Digital media receivers**
 - Vertex Link Corp. DMR in Japan MediaWiz HD
 - Twinhead International Corp. Digishare digital media receiver
- **Internet Protocol television (IPTV) set-top boxes**
 - WEGENER IP video set-top SMD 515 Streaming Media Decoder



WM High Definition (WMV HD)

- **Windows Media High Definition Video**

- Defacto HD presentation format
- HD Video - 720p up to 1080p
- WM Audio Professional - multichannel
 - Six (5.1) or eight (7.1) channels, up to 24-bit / 96 kHz
 - 128 to 768 Kbps, 16 or 24 bits, 44.1, 48, 88.2, 96 kHz
- Recommend: 3 GHz, 512 MB, 1920 x 1440, surround



- **Windows Media HD Applications**

- Film – Sundance, Landmark theatres
- DVDs – Full HD movie
- Digital Rights Management (DRM)
- *Standing in the Shadows of Motown* (2003)
- *Terminator 2: T2 – Extreme Edition* (2003)
 - 1440/1920 x 816 - CBR 6.8 Mbps -152 min. in 6.5 GB
 - WMA 5.1 channel surround - 1-pass, 48 kHz, 16-bit, 440 Kbps



WMV HD DVDs



- **Ten IMAX DVDs - Full WMV HD DVD production**

- ***Step into Liquid***

- WMV 9 Pro - 1280 x 692 (1:85:1) - 8.4 Mbps - 1:28 in 5.4 GB
- WMA 9 Pro - 5.1 channel - 1-pass CBR, 48 kHz, 24-bit, 440 kbps

- ***Coral Reef Adventure***

- 47 min.: 720p in 2.1 GB (6.4 Mbps) /1080p in 2.7 GB (8.4 Mbps)

- **Menus Dynamically Composed**

- Windows AutoRun
- Licence check – WM DRM, renew weekly
- HTML based application (.HTA) splash screen
- Application in JavaScript and DHTML
- Disc experience - XML data file
- Menus HTML with CSS style sheets



- **Authoring Guide**

- wmvhd.com - www.microsoft.com/windows/windowsmedia/content_provider/wmvhddvd/default.aspx

Coral Reef Adventure – Menus

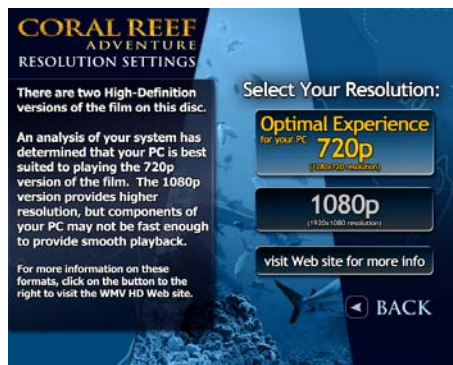


Main Menu



Chapters Menu

Coral Reef Adventure – Setup



Coral Reef Adventure (H:)		Trailer	File Folder	11/23/2003 5:20 PM
AUDIO_TS		Trailer720	File Folder	11/23/2003 5:20 PM
components		CoraReef720p.wmv	2,099,402 KB	Windows Media Audio/Video file
menu		CoraReef_Feature.wmv	2,767,585 KB	Windows Media Audio/Video file
Video		macFree.wmv	6,691 KB	Windows Media Audio/Video file
Trailer		Splash.wmv	6,630 KB	Windows Media Audio/Video file
Trailer720		surroundTest.wmv	5,135 KB	Windows Media Audio/Video file
VIDEO_TS				10/9/2003 9:21 PM

Windows Media Encoder

www.microsoft.com/windows/windowsmedia/9series/encoder

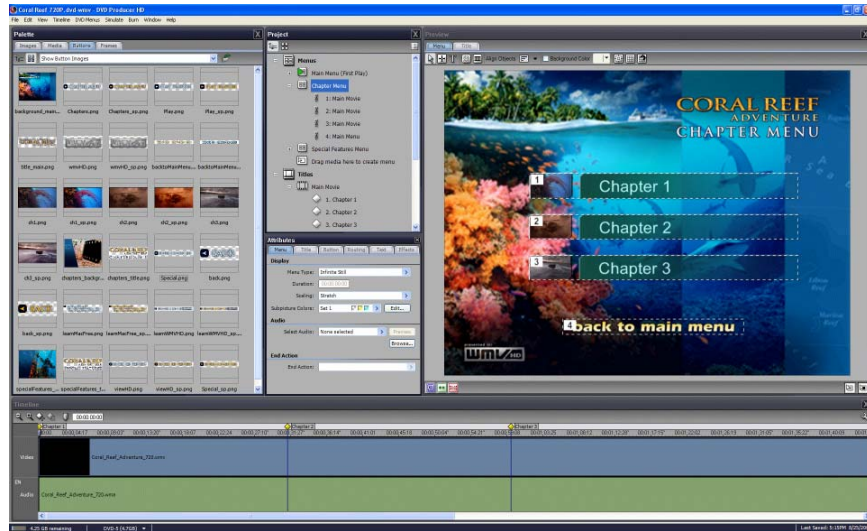
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WMV HD Authoring - DVD Producer

- **Sonic DVD Producer – WMV HD Edition**
 - Author HD titles on DVD using WMV HD technology
 - End 2004, \$12,999
 - Playable on Windows Media 9 Series player on Win XP
 - New authoring user interface, DVDit 5, June 2004
 - www.sonic.com/dvdproducerhd
- **Goal: Interface & authoring metaphor format agnostic**
 - DVD Producer 5 - early 2005
 - HD series encoder
 - PCI real-time hardware encoding
 - WMV HD video and WMA surround-sound audio



DVD Producer HD – Interface



DVD Producer HD – Authoring

- **Generic WMV HD DVD design template**
 - DVD-like interface for menu interaction and content playback
 - Supporting components - License management
 - System configuration: HD display, Surround sound
 - Authoring tool creates a disc-specific script file
 - Define and manage menus and interaction
- **Menu design**
 - Significantly higher display resolution
 - Button highlighting by swapping in new graphics
 - Not motion menu backgrounds or motion video in buttons
- **Clips**
 - Imported in WMV format
 - No format conversion, resizing, or transcoding
 - Clips displayed by Windows Media architecture
 - Dynamically reformatted to current display format and window resolution

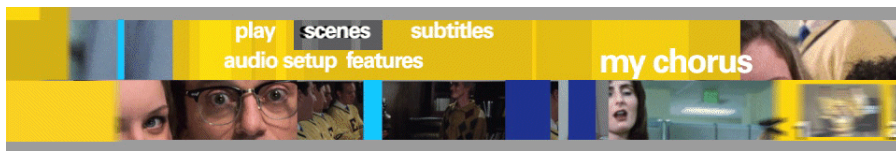


DVD Producer HD – Enhancements

- **Build**
 - Easy simulation - No flattening, muxing
- **Run-time Player Engine**
 - Processes HTML menu descriptions
 - Dynamically composite elements to final display
- **Merge DVD and Web Interfaces**
 - Multiple aspect ratios (initial 16:9, 1920 x 1080 res)
 - Navigation end actions and button routing
 - Multiple language menus, audio and subtitles
 - Mouse-over roll-over effects; Web links; User ops
 - Access to built-in Windows components

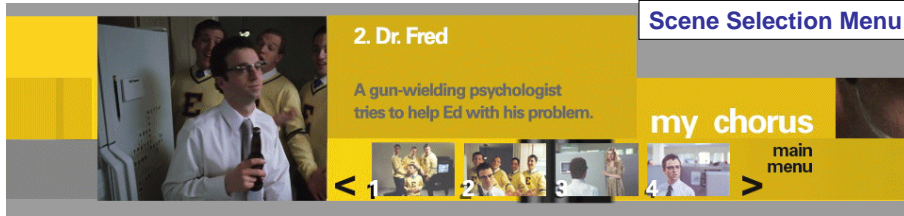


HD Authoring (Blu-ray)



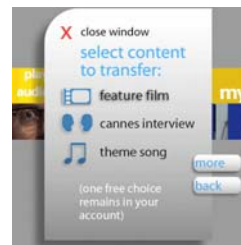
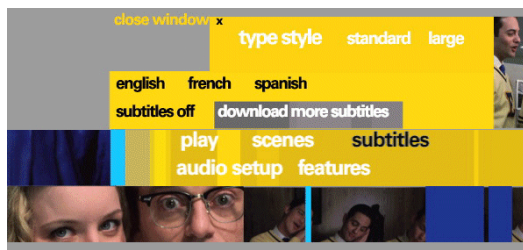
- **Advanced Interactivity and Communications**
 - Motion and interactivity
 - Remove modal constraints and limitations
- **Video layer – HDMV – High Definition Movie mode**
 - Like today's DVDs – video, menus, navigation
 - Can be authored with extensions of today's tools
- **Interactive layer / mode – BD-J – Java platform**
 - Java programming environment
 - Full interactive applications
 - Communications interface to external devices, Internet

HD Authoring – Interactivity



- **Interactive Menus**
 - Full-color – Video, animated graphics, dynamic text
 - Scene selection scrolls all thumbnails on same menu
 - Motion video and audio play continuously
- **Web-like / Flash-like Interaction**
 - Highlighting effects, page transitions
 - Animated buttons and click sounds
- **Full interactive applications and games**

HD Authoring – Connectivity



- **Internet to servers and websites**
 - Additional content
 - Clips, games, new releases, subtitles
 - Related products, discounts
- **Local network to computers and CE devices**
 - Copy files to local PC

Potential New Functions of HD DVD

The high transfer rate of HD DVD will achieve new forms of entertainment, such as synchronized playback of different images while watching the main image or viewing movies while listening to a commentary by the director. Gaming could also be available.



Note: This shows a potential capability of HD DVD and is not a function of the HD DVD Video format.

Potential New Functions of HD DVD

HD DVD's high-level interactivity can be fully utilized to download bonus content via the Internet, to purchase related content online, and to access game content. HD DVD will open up new vistas in entertainment



Note: This shows a potential capability of HD DVD and is not a function of the HD DVD Video format.

Authoring – HD DVD

- **HD-DVD advanced content**
 - Declarative Markup + Script
 - W3C - World Wide Web Consortium (w3.org)
- **XHTML – Extensible Hypertext Markup Language**
 - HTML documents made XML compliant
- **CSS – Cascading Style Sheets**
 - Separate content and layout
- **SMIL – Synchronized Media Integration Language**
 - Coordinate multiple media streams
- **JavaScript / ECMAScript Scripting**
 - ECMA-262 / ISO – ecma-international.org

Future of DVD Authoring

- **Professional tools coming**
 - Current tools could adapt to basic HD productions
 - Sonic: ScenaristHD (movie), InterActual (interactive)
 - ZOOTEch DVD-EXTRA STUDIO
- **Interactive productions require programming**
 - More like Web application development
 - General Java programming skills
 - Multimedia tools like Flash
- **Opportunity for custom interfaces**
 - Common user interface and communications libraries
- **Passive DVD viewing becomes interactive experience**
- **DVD authors become more like software developers**

References

- **DVD FAQ – Jim Taylor**
– www.dvddemystified.com/dvdfaq.html
- **Blu-ray Disc Association (BDA)**
– www.blu-raydisc.com
- **HD DVD Promotion Group**
– www.hddvdprg.com
- **MPEG-4**
– MPEG Industry Forum - www.mpegif.org
– Apple MPEG-4 - www.apple.com/mpeg4
- **Apple QuickTime 6 (7/02)**
– www.apple.com/mpeg4
- **Microsoft Windows Media Video - HD**
– www.microsoft.com/windows/windowsmedia
– www.wmvhd.com
- **Sonic Solutions - DVD Producer HD**
– www.sonic.com/products/dvdproducerhd



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