Digital Storage and Applications at 2008 ICCE and 2008 CES

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External Storage was all over the CES including many mobile backup devices as well as desktop devices.

- There were DirectAttached Storage (DAS) as well as Network Attached Storage (NAS).
- Several companies were showing mostly eSATA interface external storage for DVR expanders.
- One company, Clickfree, showed a portable external storage device that backed up automatically when it was plugged in without backup software on the computer or a button to touch.
External Storage 2
External Storage 3

Marvell Booth

Oxford Semi Prototype at MoCA Press Conference

2008, Coughlin Associates
External Storage 4
Mobile External HDDs

Growing Category of Products

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Personal Area Network Storage (PANS)

- A hard disk drive-based external storage device with wireless connectivity allows storage expansion, streaming and content aggregation

Seagate’s DAVE
Removable HDDs

- There were several products with removable hard disk drives for large capacity removable storage—these are complete drives in portable packages.
iVDR

• Seagate announced that they were joining the iVDR Alliance, promoting a format of removable hard disk drives that has been in development, primarily in Japan for the last 5 years.
New Media for the Age of Full-HD Resolution
“iVDR-Secure”

1. What is iVDR?
The iVDR is a new medium that provides a capability of sharing various contents, including movies, music, and programs, over a broad range of devices such as information appliances, home servers, video recorders, automobile AV device and personal computers.
- iVDR: Information Versatile Disk for Removable usage
- SAFIA: Security Architecture for Intelligent Attachment device

2. Features of iVDR-Secure with SAFIA
(1) Contents encryption and secure transfer protocol for strong security.
(2) Integration of contents encryption key and usage rule into the Usage Pass for secure access to contents.
(3) Secure and high-speed transferring as characteristics of HDD.
(4) iVDR-Secure can be used as a normal HDD.

3. Main Line Up of iVDR-Secure

<table>
<thead>
<tr>
<th>Cartidge type (removable)</th>
<th>Built-in type</th>
</tr>
</thead>
<tbody>
<tr>
<td>iVDR-Secure</td>
<td>(3.5 inch)</td>
</tr>
<tr>
<td>iVDR-Secure Mini</td>
<td></td>
</tr>
<tr>
<td>iVDR Card (1.8 inch) Under consideration</td>
<td></td>
</tr>
</tbody>
</table>

4. iVDR-Secure Specifications (Cartidge type)

<table>
<thead>
<tr>
<th></th>
<th>iVDR-Secure</th>
<th>iVDR-Secure Mini</th>
<th>iVDR Card (Under consideration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>80mm x 12.7mm x 110mm</td>
<td>80mm x 10mm x 67mm</td>
<td>13mm x 7mm x 60mm (Temporary)</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>More than 9000 (When not in operation)</td>
<td>Under consideration</td>
<td></td>
</tr>
<tr>
<td>Environment temperature</td>
<td>-40 – 85 ℃ (Recommendation)</td>
<td>Under consideration</td>
<td></td>
</tr>
<tr>
<td>Connector durability</td>
<td>28pin iVDR original / Connect &amp; disconnect 10,000 times</td>
<td>Same as iVDR-Secure/Mini (Temporary)</td>
<td>Same as iVDR-Secure/Mini (Temporary)</td>
</tr>
<tr>
<td>Interface</td>
<td>Serial ATA</td>
<td>Same as iVDR-Secure/Mini (Temporary)</td>
<td>Same as iVDR-Secure/Mini (Temporary)</td>
</tr>
<tr>
<td>HDD structure</td>
<td>Tamper resistant module to be arranged in HDD</td>
<td>Same as iVDR-Secure/Mini (Temporary)</td>
<td>Same as iVDR-Secure/Mini (Temporary)</td>
</tr>
</tbody>
</table>
Storage in Set Top Boxes and DVRs

- Many HD set top boxes shown
- DVR expanders from several vendors allow DVR expansion
- Internet and home networks allow sharing content
Storage in Set Top Boxes and DVRs 2
Media Servers

• Microsoft introduced Home Media Server Software and HP used it to show a Home Media Server Product (their goal was to make this easier to use)

• Many other companies had home media servers including some very inexpensive systems
Media Servers
Automobile Storage

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Camcorder Storage

Combination Blu-ray and HDD Camcorder, Hitachi

New Breed of Inexpensive Flash-Based Camcorders

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Hard Disk Drives

Fujitsu

Toshiba

Samsung Spinpoint F1, 1 TB 3.5-inch drive

Seagate

Spinpoint N2, 160GB
- Industry’s highest capacity of up to 160GB
- Designed to meet the surging capacity requirements from multimedia applications
- Advanced free fall sensor enhances reliability by helping the drive to protect itself in the event the drive is dropped while functioning.

Spinpoint A1, 40GB
- Ultra compact 1.3 inch hard drives up to 40GB with 3,600 rpm
- Optimization for portable music players, mobile phones, camcorders and PMP
- Optimized System On Chip (SOC) technology consumes less power, enabling longer mobile device use times

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Hard Disk Drives 2

- Seagate showed internal and external FDE encrypted HDDs

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Solid State Drives (SSD)

Intel Z-P140

Inexpensive PCs

SanDisk

SanDisk Vaulter

Samsung

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• Warner Brothers announced that they were dropping the HD-DVD format and rumors were that Dreamworks and Universal could follow
• The HD optical format war may be close to resolution—Blu-ray wins
Flash Memory

Sandisk Ducati

Corsair

Team

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Content Distribution

Embedded BitTorrent™ optimized for Marvell Chipsets
- BitTorrent file downloads without the PC
- SHA-1 hardware acceleration for faster downloads
- Reference web browser based user interface
- HTTP API for easy integration on media vaults, set-top boxes or home routers
- BitTorrent DNA™ streaming support
- Fully compatible with all standard BitTorrent clients

Software Optimized for Marvell Media Vault
- Personal digital media software platform for CPE devices such as media vaults, set-top boxes, or home gateway/routers
- Easy-to-use home network management and personal digital media server solution
- Modular operating environment and applications suite for any Marvell-based embedded device
- Securely store, manage, distribute, and share your digital photos, music, and videos from any connected device – anywhere, anytime!

2008, Coughlin Associates
Kiosk Content Distribution

At IBM Booth

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## 3D HD Video

Source: Opportunities for 3D on Blu-ray Disc, P. Newton, F. Scalori, F. Bruls, Philips Research Laboratories, Paper 4.3-6, 2008 ICCE Conference

<table>
<thead>
<tr>
<th>Format</th>
<th>2D</th>
<th>2D + Depth</th>
<th>2D - depth + occlusion</th>
<th>Stereo</th>
<th>Stereo + depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size after coding in %</td>
<td>100</td>
<td>130</td>
<td>150</td>
<td>150</td>
<td>180</td>
</tr>
<tr>
<td>Bandwidth (video only)</td>
<td>15</td>
<td>20</td>
<td>23</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td>Playing time in min. HD-DVD</td>
<td>190</td>
<td>140</td>
<td>120</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Blu-ray</td>
<td>310</td>
<td>240</td>
<td>210</td>
<td>210</td>
<td>170</td>
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