The Elusive "Promise" of Holographic Data Storage

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Holographic Archive Storage Benefits

**High capacity and performance**
- Capacities from 10 TB to 40TB per cartridge (LTO size)
- 5 to 7 disks per cartridge
- Transfer rates >200MB/s (multiple heads can give > 1 GB/s)
- 1 to 5 PB in 14U rack mount library

**Media Robustness**
- >50+ year archive life
- No special handling required
- Large temperature and humidity robustness

**Data Access**
- Random access (<100ms) once loaded
- Low latency (<10 seconds) compared to tape (> minutes)

**Excellent Total Cost of Ownership (TCO)**
- Low cost media (its plastic)
- Reduced migration frequency
## Technology Comparisons

<table>
<thead>
<tr>
<th>Component</th>
<th>Component Density</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDD</td>
<td>126 GB/in³</td>
<td>$0.10/GB</td>
</tr>
<tr>
<td>NAND (2.5”)</td>
<td>121 GB/in³</td>
<td>$1.00/GB</td>
</tr>
<tr>
<td>Tape (LTO6)</td>
<td>177 GB/in³</td>
<td>$0.04/GB</td>
</tr>
<tr>
<td>Holographic (<strong>2017)</strong></td>
<td>905 GB/in³</td>
<td>$0.01/GB</td>
</tr>
</tbody>
</table>
# Roadmap to a Competitive Drive

<table>
<thead>
<tr>
<th>Bit Density</th>
<th>Gen 1: 2.5 Tb/in²</th>
<th>Gen 2: 5 Tb/in²</th>
<th>Gen 3: 9 Tb/in²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cartridge Capacity</strong>*</td>
<td>10TB</td>
<td>20TB</td>
<td>40TB</td>
</tr>
<tr>
<td><strong>Product Speed</strong></td>
<td>150 MB/s</td>
<td>250 MB/s Wr</td>
<td>300 MB/s Wr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>304 MB/s Rd</td>
<td>420 MB/s Rd</td>
</tr>
</tbody>
</table>

*Cartridge size: 102.0 × 105.4 × 21.5 mm (LTO slot compatible)
Holographic Storage Library Definition

~2017 Availability

(Initial Estimated Specifications)

- 14U rack  17.5 x 36.5 x 24.5h
- >1.0 PB of data storage
- Storage life  >50 years with wide temp. range
- 10-15 seconds average access time
- 180 - 350 MBytes/sec transfer rate

Multiple head technology possible with > 1GB/s transfer rate per drive
Thank You