



## **Holographic technology and product development update**

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80305-5602**

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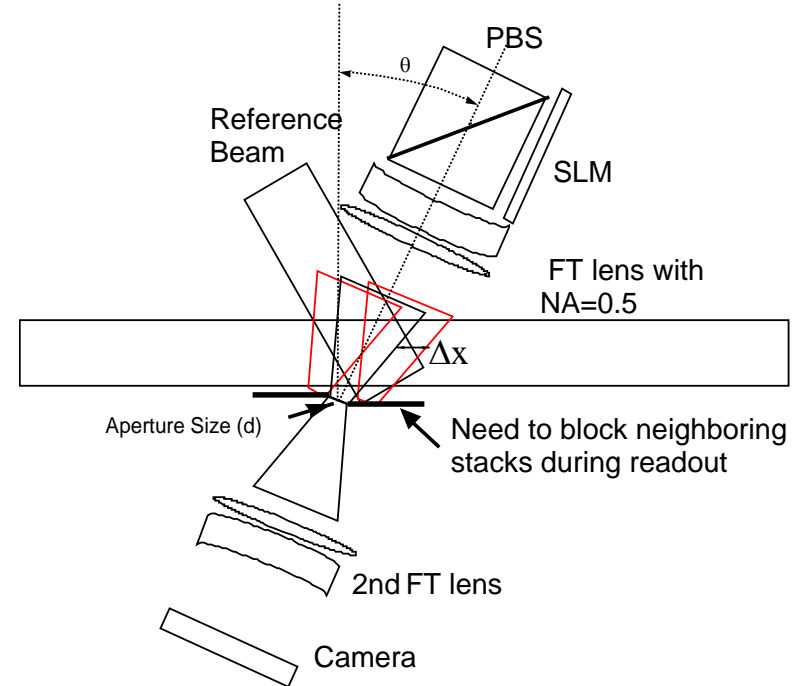
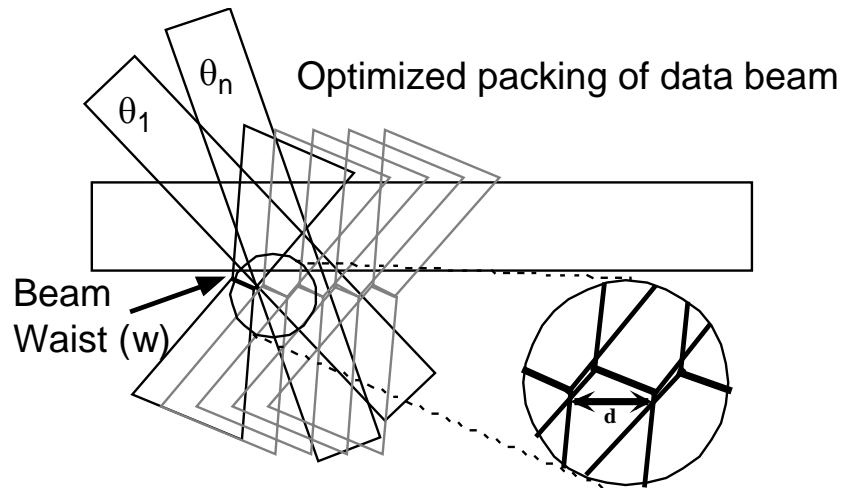
## Agenda

- Technology Overview
  - Opto-Mechanical Assembly (OMA) architecture
  - Polytopic filter and Phase Conjugation
  - Technology roadmap
- Prorotype and Product development update
  - Drive development status update
  - Product road map
  - First generation product specifications
  - Partners and potential users

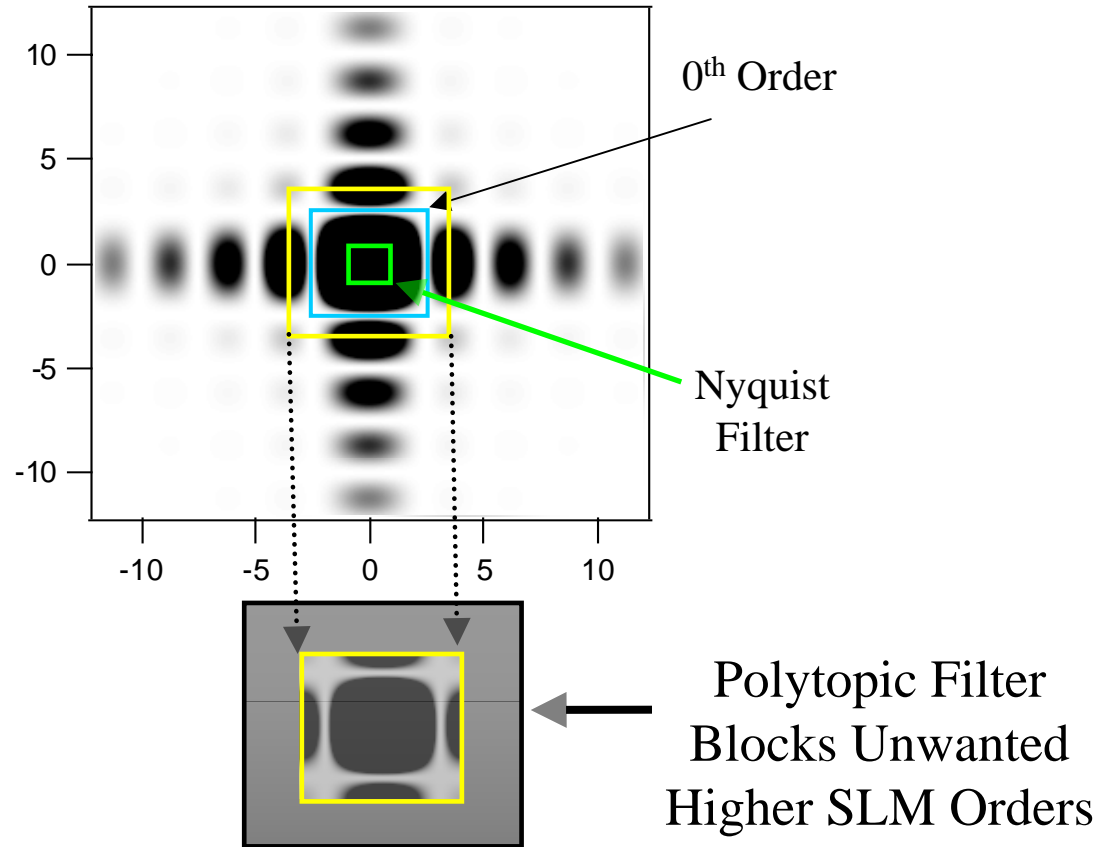
## Technology overview

## Technology enhancements for our product development:

- Continuing with the use of the Polytopic filter and Phase and Conjugation architecture for our drive development.
- Developing new custom components:
  - New 1200 x 1200 pixel SLM development
  - New 1600 x 1600 pixel camera development (with higher sensitivity)
  - New fast shutter (new development for long life and reliability)
  - New Opto-Mechanical Assembly (OMA) design
  - Blue tunable laser (with Sony's help)
  - Phase Mask development
- Invented oversampling technique to avoid moving the camera to achieve pixel matching.
- New channel development to support oversampling and a high transfer rate with robust data reliability (10 x E-15 error rate).

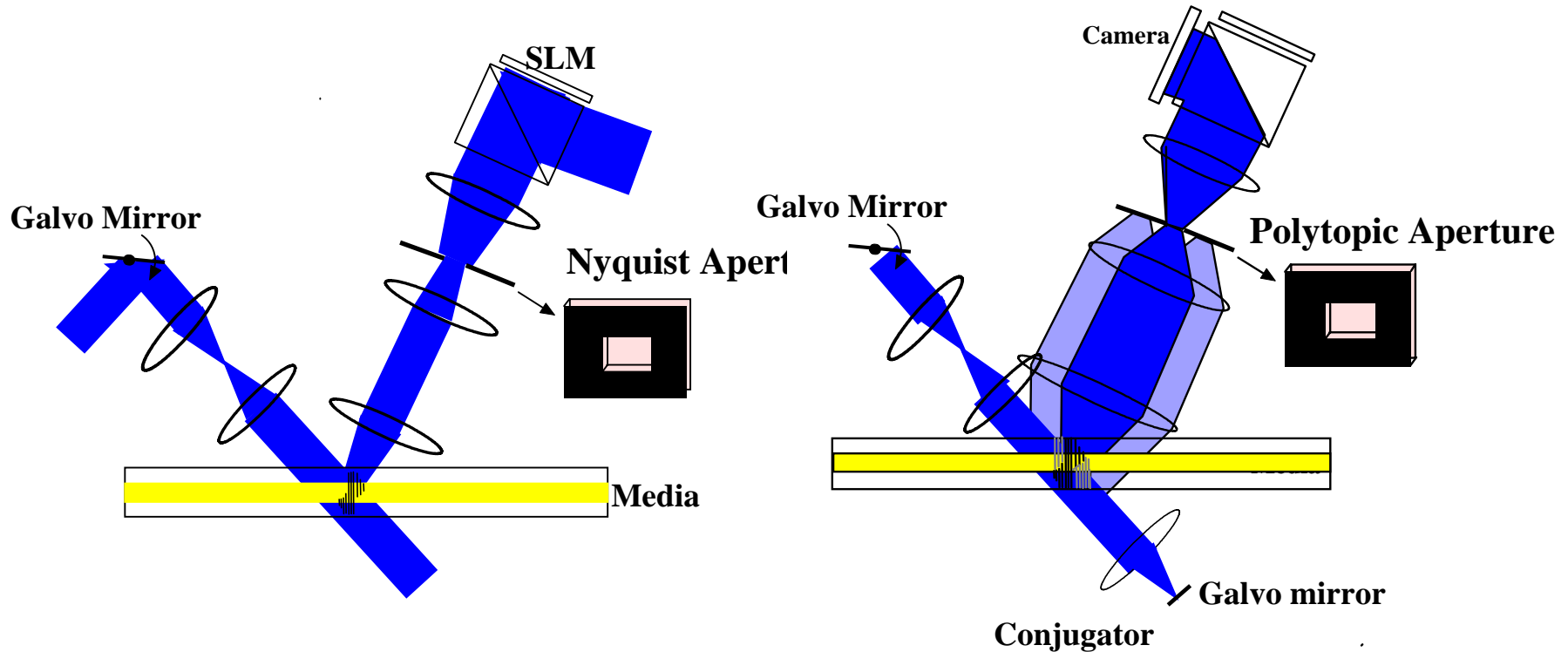


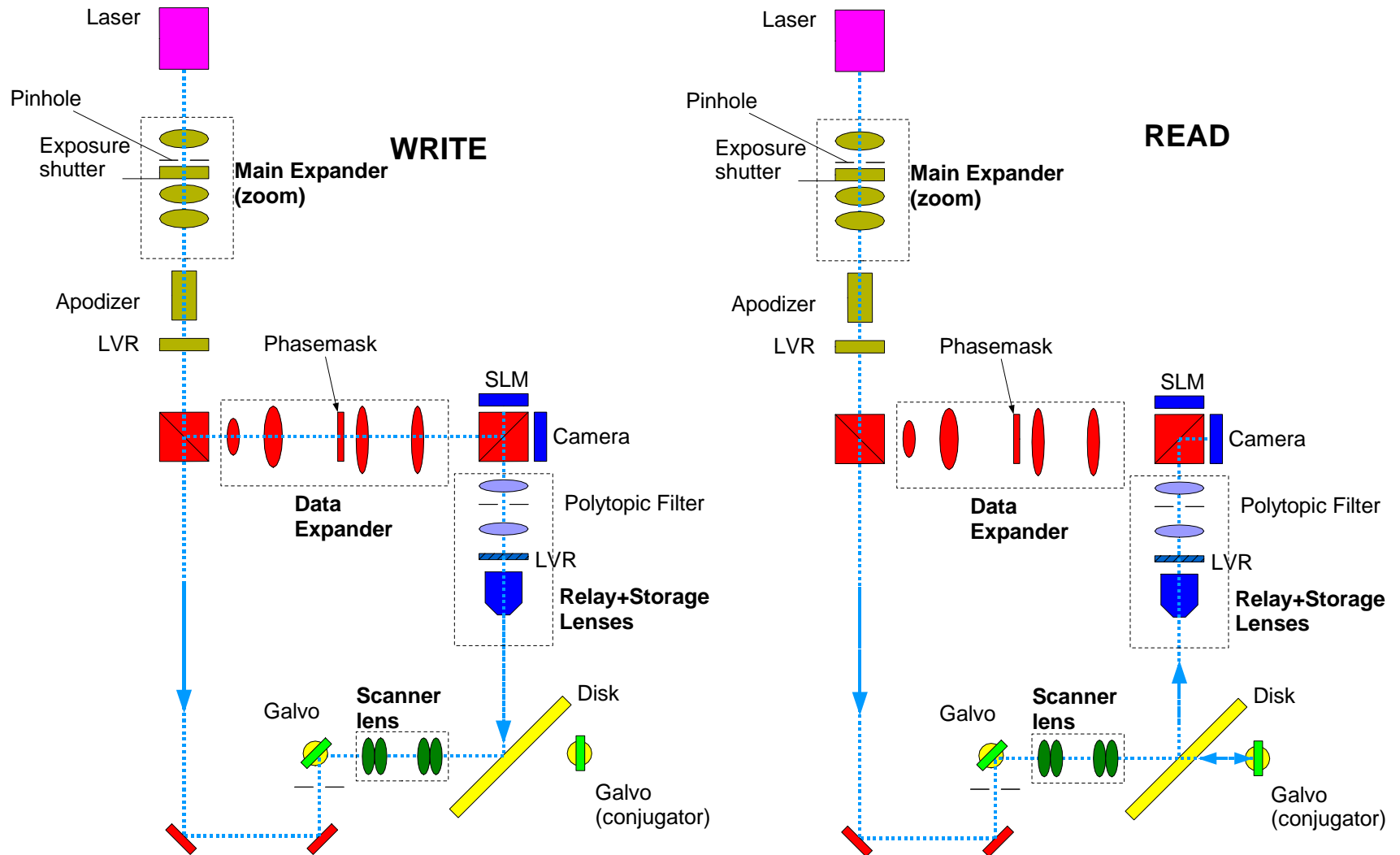
**At the Fourier/Focus  
plane of SLM**



*Write*

*Read*







	<b>P1</b>	<b>P2</b>	<b>P3</b>
<b>Areal density</b>	300 Gb / in <sup>2</sup>	800 Gb / in <sup>2</sup>	1600 Gb / in <sup>2</sup>
<b>Transfer rate</b>	20 MB/s	80 MB/s	120 MB/s
<b># of pages per book</b>	144	325	662
<b>Reference Beam Sweep (degrees)</b>	10	24.5	25
<b>Hologram pitch (<math>\theta</math>, r) (mm)</b>	0.82, 0.48	0.82, 0.48	0.82, 0.48
<b>Nyquist filter / Beam Waist area</b>	1.2x	1.2x	1.2x
<b>NA of object beam</b>	0.6	0.6	0.6
<b>Bragg Null</b>	2nd	2nd	1st
<b>SLM/Camera Pixels</b>	1200x1200/1600x1600	1200x1200/1600x1600	1200x1200/1600x1600
<b>Wavelength (nm)</b>	407	407	407
<b>Material Thickness (mm)</b>	1.5	1.5	1.5
<b>M# of media @1.5mm</b>	33.3	90	135

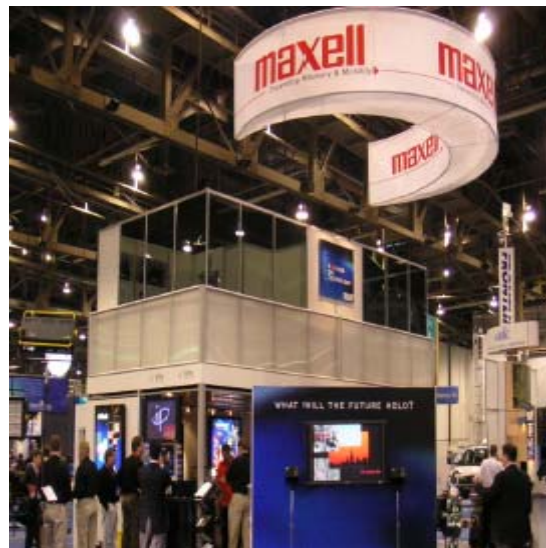
**Angle and Polytopic Multiplexing**

**Compatible with RW media**

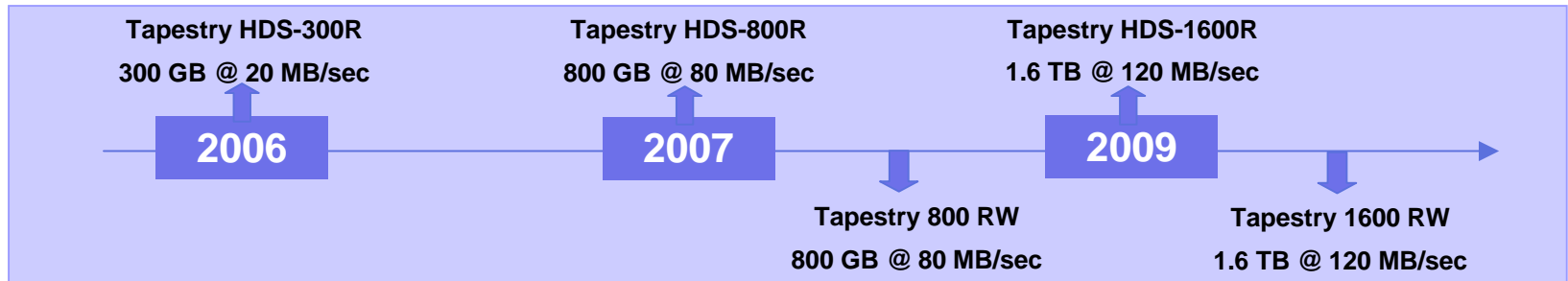
## **Product development update**

## Drive development status

- We completed the development of six prototype drives:
  - Demonstrated read/write and seek functionality
  - Demonstrated cartridge interchange
  - Demonstrated the prototype at the NAB show last April and many other shows and conferences after NAB.
- We are now well into the drive development stage of the program.
  - Developing new components and subassemblies.
  - We are detailing the OMA opto-mechanics. Optics are being fabricated.
  - Very close to signing a drive manufacturing partner.
  - All electronics hardware/firmware development is currently on schedule.
- We see no “show-stoppers” for completing the drive development on time and no new inventions are required.
- Goal: to begin revenue shipments in late 2006.



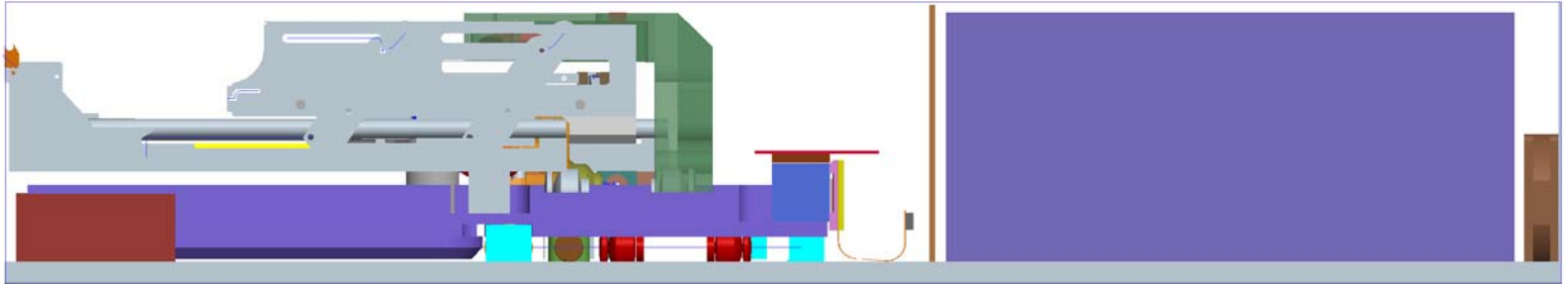
## Roadmap for Recordable Products



Two product families planned:

-Recordable (starting in 2006)

-Re-writable (starting in 2008)

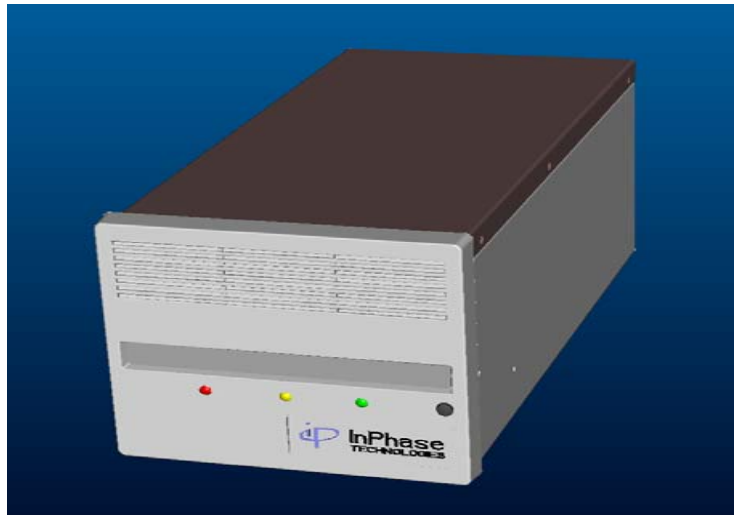


## Preliminary drive dimensions:

Height: 3 x HH (5.24")

Width: Standard 5.75"

Length: 27"



## DRIVE

- 300 GB Capacity
- 20 MB/s Transfer Rate
- 250 ms avg. access time
- 407 nm Laser
- 1.4 megabits/page
- 5.5 sec. Cartridge load time
- 3.5 sec. Cartridge unload time
- BER  $<10^{-15}$
- 100K power on hours MTBF

## MEDIA

- 130 mm disc
- 5.25" X 6" X .25" cartridge FF
- 3 year shelf life (prior to recording)
- >50 year archive life

- **Technology and product introduction activities:**
  - Working with several robotics library manufacturers.
  - Also talking with several major potential HDS drive users in the archival and professional video industries.
- **Media partnerships:**
  - Maxell (planning a second media volume production source)
  - Bayer (for chemicals)
- **Drive development relationships and partnerships:**
  - Sanyo- Opto-Mechanical Assembly
  - Sony - Blue Lasers
  - Alps - Loader and drive mechanics
  - DisplayTech – SLM
  - FillFactory - Camera
- **Media and Test Equipment Sales**
  - 23 companies are InPhase media customers
  - We have also sold several “plane wave” and “digital” test equipment to several companies.