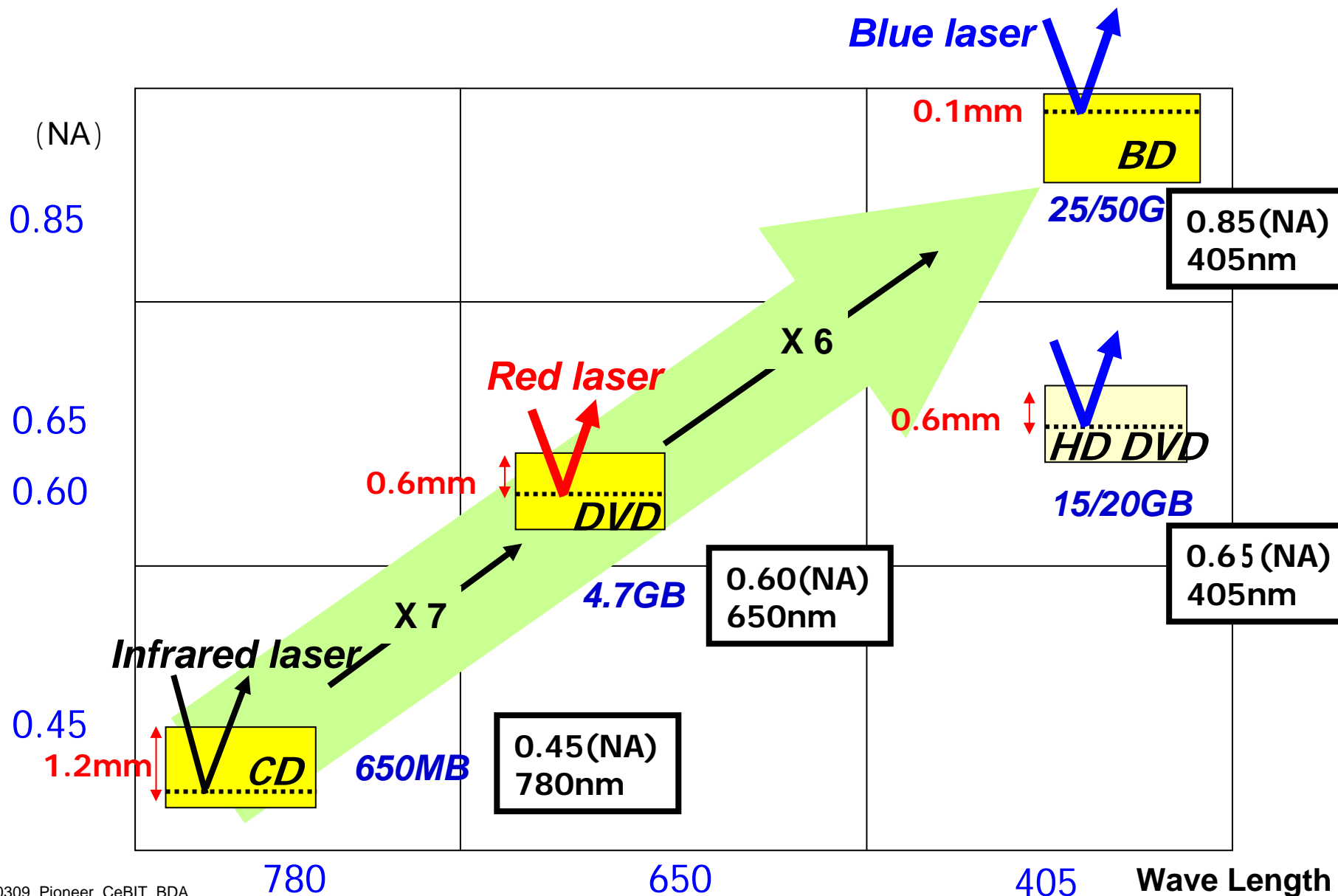




The "BDR-101A" - BD-R/RE, DVD  $\pm$  R/RW Compatible Writer

Coming very soon ☺ - And next? A look into possible roadmap ingredients

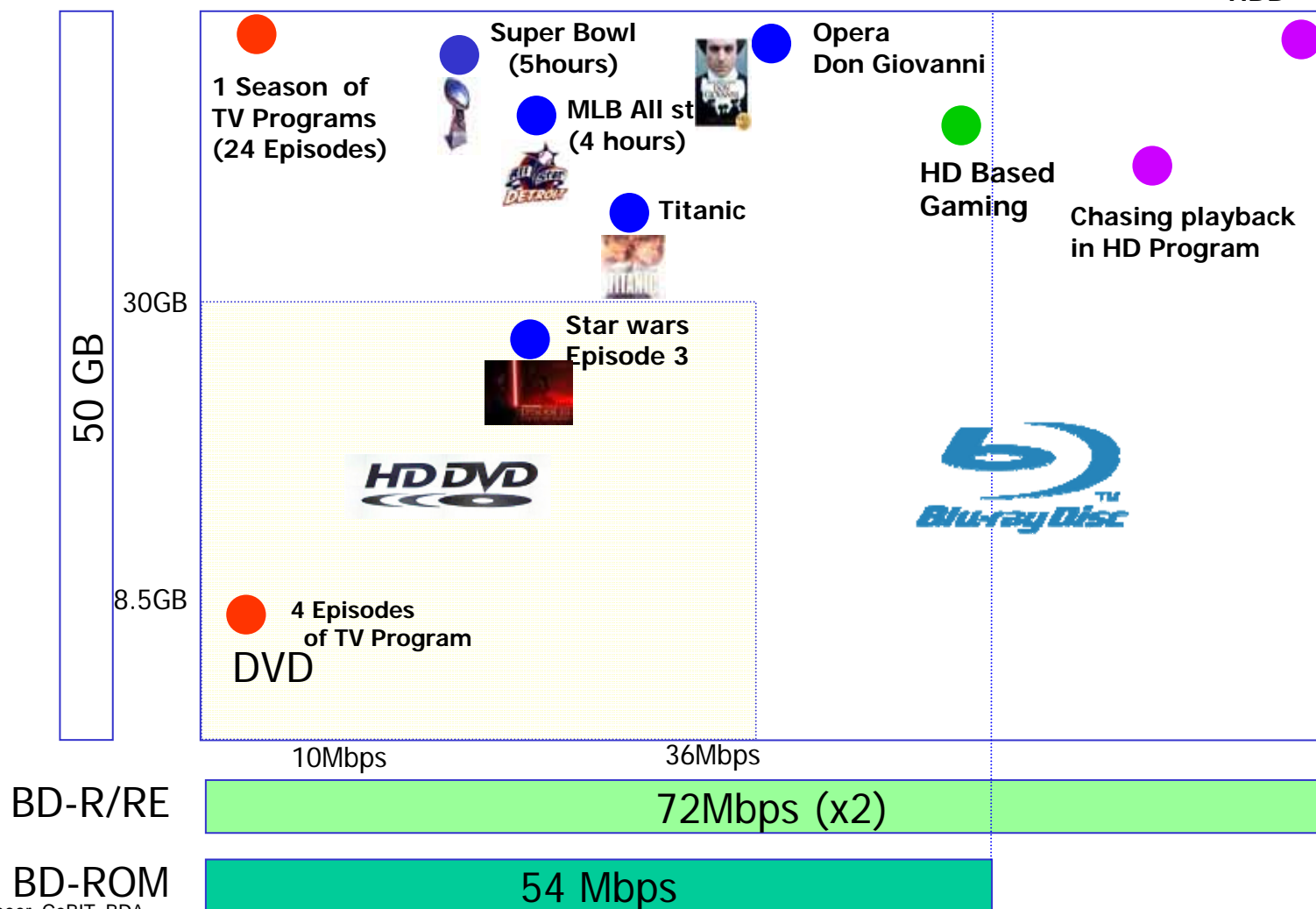
# Optical Disc Evolution – Wave Length and Numerical Aperture



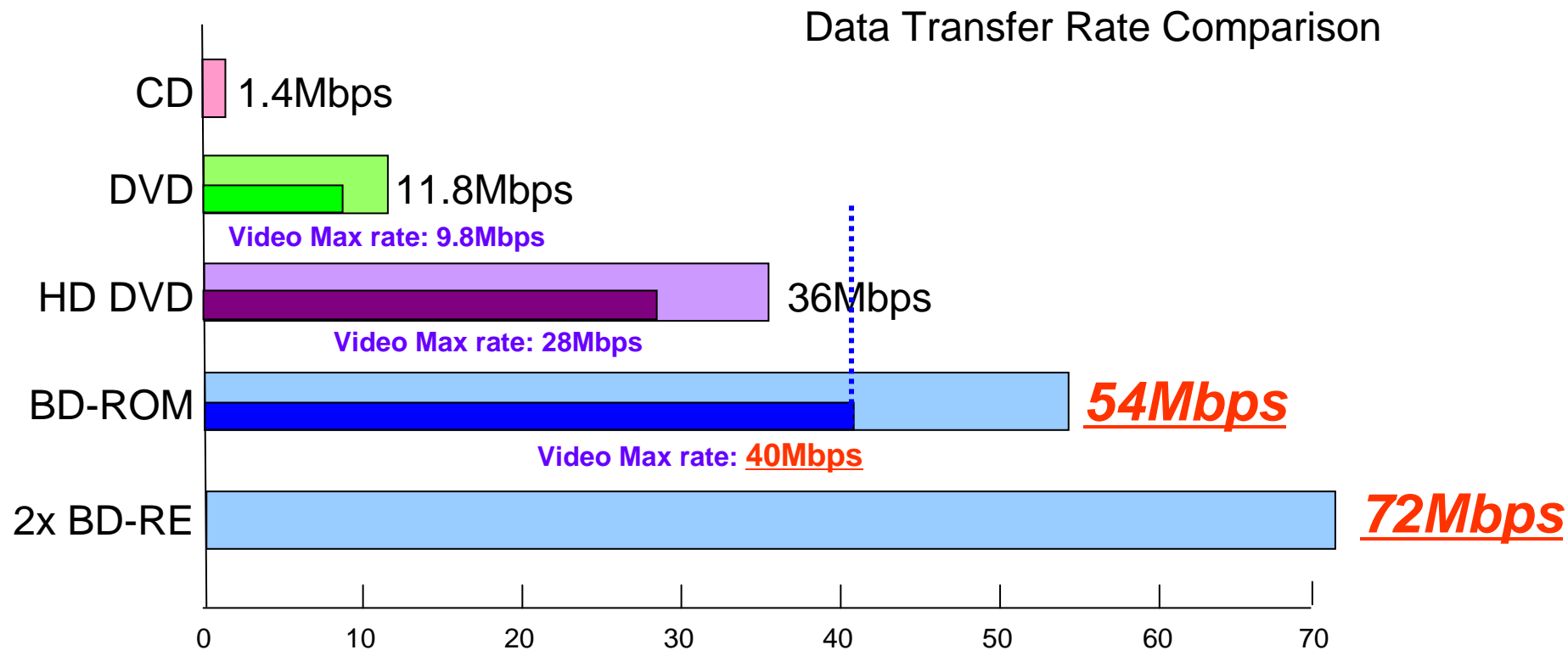
## Huge Capacity and High Transfer Rate Offer Big Potential

Long time recording  
Higher Quality HD Audio and Video Playback and Recording  
HD Quality based gaming  
More Attractive Functions etc...

High Speed Dubbing  
HDD => BD



## Blu-ray Disc realizes the highest Data Transfer Rate



Higher Transfer Rate allow Better Picture Quality

## BDR-101A – Core Specifications

- Half Height
- Tray loading
- ATAPI interface

- Write Speed:
 

BD-R (SL)	= 2X
BD-RE (SL)	= 2X
DVD-R / +R	= 8X
DVD-R DL / +R DL	= 2X / 2.4X
DVD-RW / +RW	= 4X

- Read Speed:
 

BD-ROM (SL/DL w/o CP)	= 2X
BD-ROM (SL/DL with CP)	= 2X
BD-R (SL)	= 2X
BD-RE (SL)	= 2X
DVD-ROM (SL/DL)	= 8X
DVD-Video (SL/DL)	= 5X
DVD-R / +R	= 8X
DVD-R DL / +R DL	= 6X
DVD-RW / +RW	= 6X

- CPS:
 

AACS
BD+
ROM Mark



## Possible enhancements – Playback / Writable Media

### • Media Playback by **BDR-101A**

- BD-ROM SL/DL
- BD-R SL
- BD-RE SL
- DVD-ROM SL/DL (incl. DVD-Video)
- DVD-R / +R
- DVD-R DL / +R DL
- DVD-RW / +RW

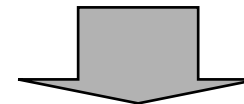


### • Possible enhancement of Media Playback

- BD-R DL
- BD-RE DL
- DVD-RAM
- CD-R
- CD-RW

### • Writable Media supported by **BDR-101A**

- BD-R SL
- BD-RE SL
- DVD-R / +R
- DVD-R DL / +R DL
- DVD-RW / +RW



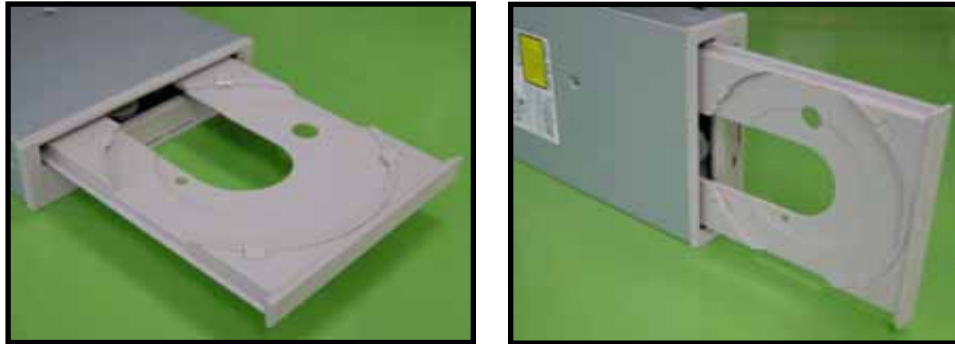
### • Possible enhancement of Writable Media support

- BD-R DL
- BD-RE DL
- DVD-RAM
- CD-R
- CD-RW

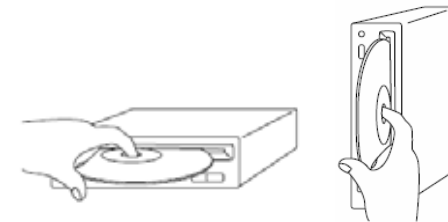
(next generation writer drive)

## Possible variations – Loading Mechanism

- **BDR-101A:** Tray Loading – bare disc (8cm/12cm) / horizontal & vertical mounting



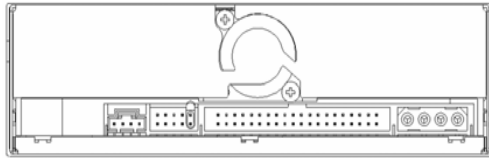
- Possible variation: Slot Loading



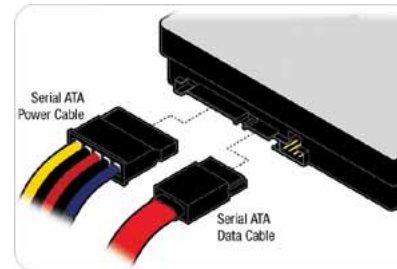
- Possible variation: Top Loading (external drive implementations)

## Possible variations – Interface

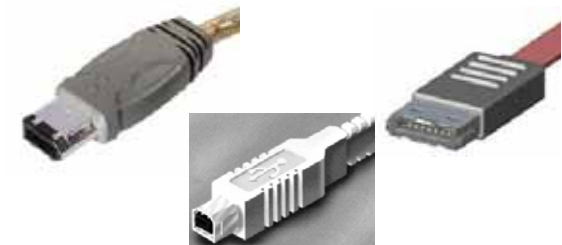
- **BDR-101A:** ATAPI



- Possible variation: SATA
- Possible variation: SCSI



- Possible variation: IEEE1394
- Possible variation: USB
- Possible variation: e-SATA





## Possible variations – Form Factor

- **BDR-101A**: Half Height – 8 cm / 12 cm – internal



- Possible variation: Half Height – 8 cm / 12 cm – external



- Possible variation: Slim – 8 cm / 12 cm – internal

- Possible variation: Slim – 8 cm / 12 cm – external

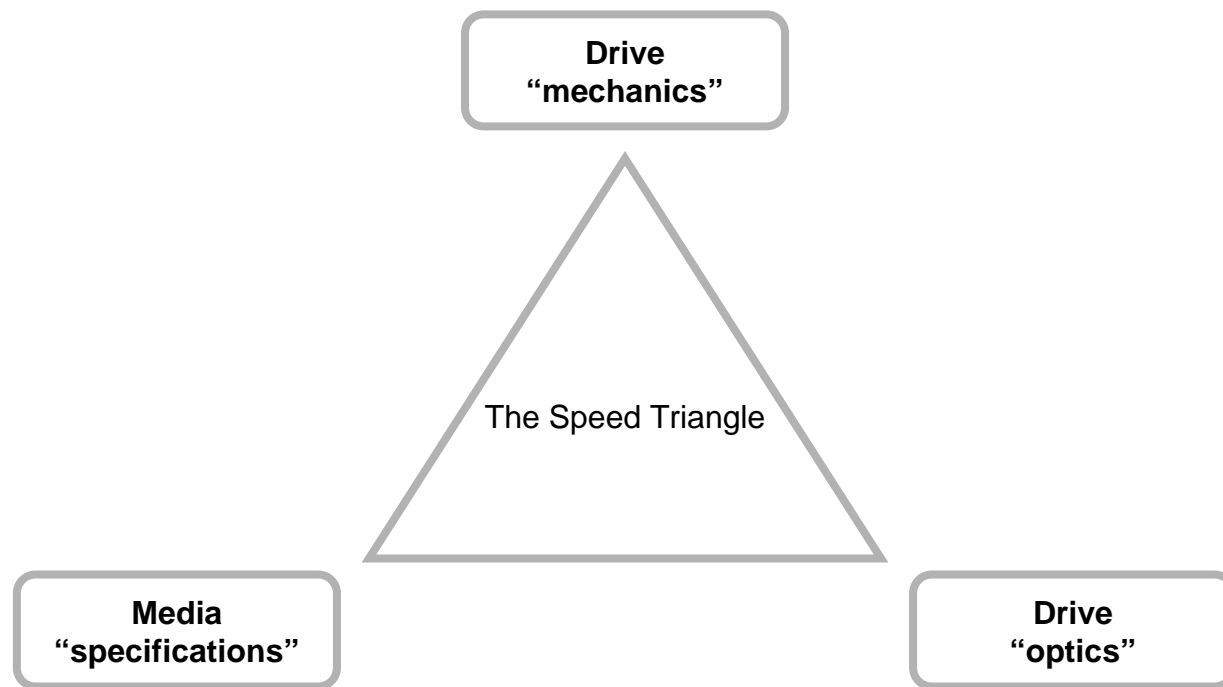


- Possible variation: Slim – 8 cm – internal
- Possible variation: Slim – 8 cm – external

For reference:  
8 cm DL BD-R disc capacity = **15.6 Gbyte**

## Possible enhancements – Writing Performance (Speed)

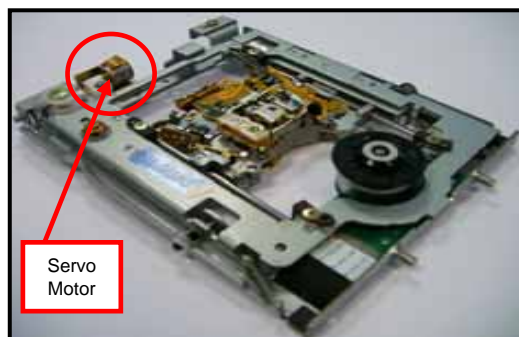
- **BDR-101A**: BD Write Speed: **BD-R (SL) = 2X** / **BD-RE (SL) = 2X**



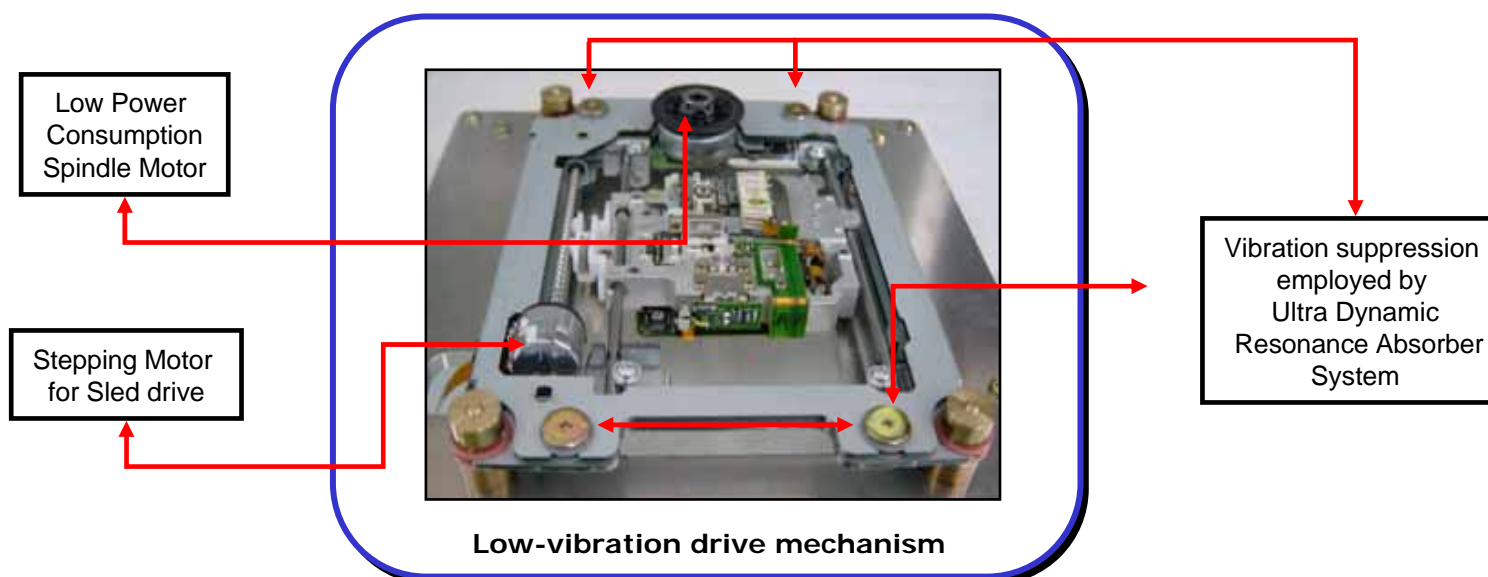
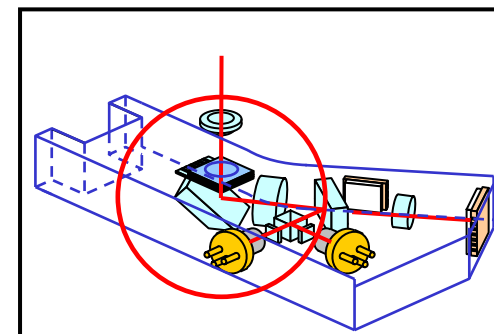
## BDR-101A – Advanced Mechanics

The **BDR-101A** uses a multi-effect “**Liquid Crystal Tilt Compensator**” as its compensation-mechanism for any “Tilt”, “Thickness” or “Blur” which is caused by the media. Offers similar performance to a “mechanical” tilt mechanism, but uses fewer moving parts. Features the ability to handle “thick”, “thin” or “imbalanced” media, an advantage which no mechanical tilt mechanism can overcome. Any “tilted discs” or discs of “different thicknesses” can be compensated-for by using the Liquid Crystal Element which is incorporated in the Optical Pick-up Assembly.

Traditional  
Servo-Driven  
Mechanism

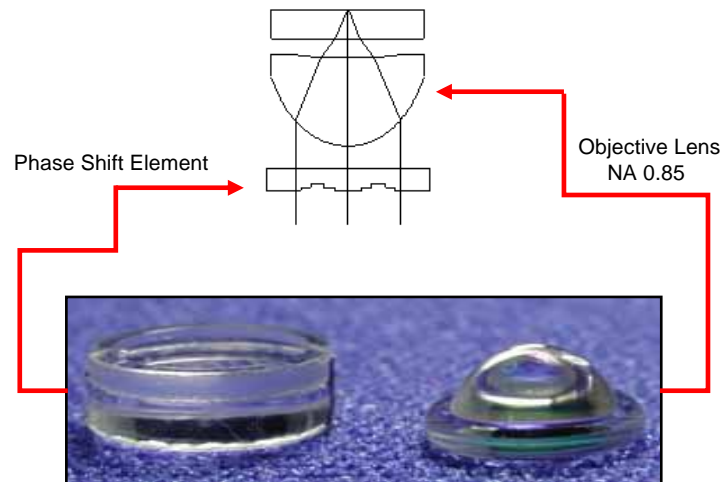


Optical Pick-Up  
Assembly with  
integrated Liquid  
Crystal Element



## BDR-101A – Advanced Optics

The 0.85NA (numerical aperture) lens is used to reduce the laser beam spot size, which in turn allows the Blu-ray recording device to record smaller and higher density pits on the media



### Single Optical Pickup Unit

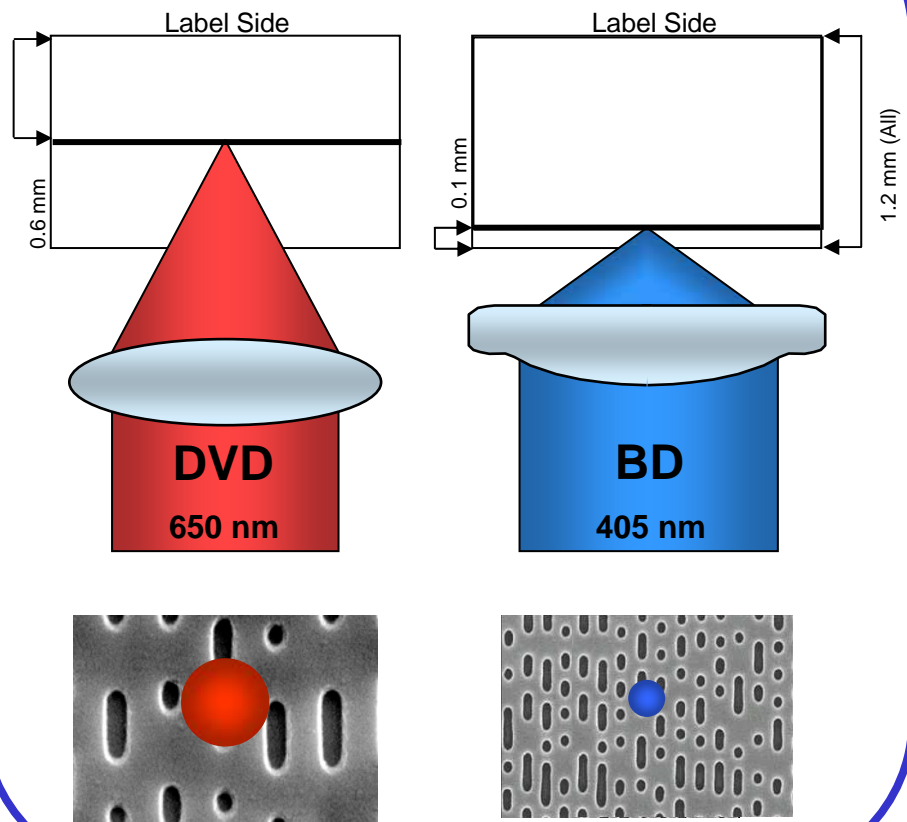


Testing DVD



Testing Blu-ray

### Comparison of Single Layer 12 cm Discs



## BD Media – The Capacity Advantage

### Higher (constant) Linear Density on the track

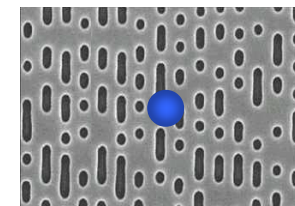
- Bigger storage capacity
- Low reference scanning velocity  
(for a given bitrate)
  - reduced “mechanics” constraints
  - flexible growth path
- hence, higher potential maximum transfer rate
  - higher potential reading / writing speed
  - BD at 1x speed can be compared to approx. 3.25x DVD speed

12 cm / single layer recordable media comparison

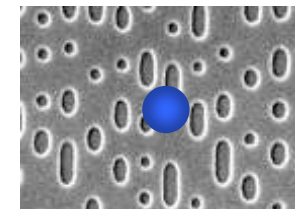
	DVD	BD
Laser Wavelength	650 nm	405 nm
Lens Numerical Aperture	0.6 NA	0.85 NA
Distance to recording layer	0.6 mm	0.1 mm
Track Pitch	0.74 micron	0.32 micron
Minimum Pit length	0.4 micron	0.149 micron
Average Channel Bit Length	0.133 micron	0.0745 micron
Reference Scanning Velocity (1x)	3.49 m/s	4.917 m/s
1x CLV User Data rate (bits/s)	11.08 Mbps	36 Mbps
1x CLV User Data rate (bytes/s)	1.32 MB/s	4.29 MB/s
Main Data Capacity (10E9 bytes)	4.70 Gbyte	25 Gbyte
Main Data Capacity (2E30 bytes)	4.32 GB	23.84 GB

### Comparison Single Layer 12 cm Discs

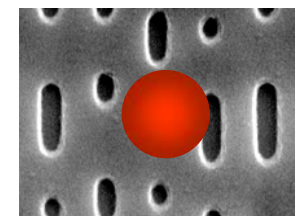
**BD**  
25 Gbyte  
(5 x DVD)

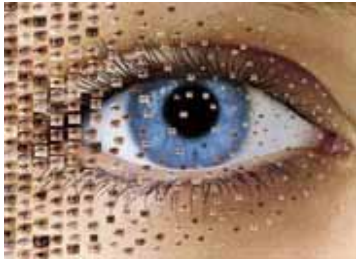


**HD DVD**  
15 Gbyte  
(3 x DVD)



**DVD**  
4.7 Gbyte





Pioneer Elite BDP-HD1 BD player  
(prototype – North-America)



Pioneer PDP-5000EX 1080p Plasma Display  
(prototype - worldwide)

Enjoy the 1080p experience!

[philippe\\_coppens@pee.pioneer.be](mailto:philippe_coppens@pee.pioneer.be)