CHAPTER -1

INTRODUCTION TO BLU RAY DISC

1.1 What is a Blu-ray disc?

Blu-ray disc is a next-generation optical disc format jointly developed by a group of leading consumer electronics and PC companies called the Blu-ray Disc Association (BDA), which succeeds the Blu-ray Disc Founders (BDF). Because it uses blue lasers, which have shorter wavelengths than traditional red lasers, it can store substantially more data in the same amount of physical space as previous technologies such as DVD and CD.A current, single-sided, standard DVD can hold 4.7 GB (gigabytes) of information. That's about the size of an average two-hour, standard-definition movie with a few extra features. But a high-definition movie, which has a much clearer image, takes up about five times more bandwidth and therefore requires a disc with about five times more storage. As TV sets and movie studios make the move to high definition, consumers are going to need playback systems with a lot more storage capacity.

The advantage to Blu-ray is the sheer amount of information it can hold:

- A single-layer Blu-ray disc, which is roughly the same size as a DVD, can hold up to 27 GB of data — that's more than two hours of high-definition video or about 13 hours of standard video.
- A double-layer Blu-ray disc can store up to 54 GB, enough to hold about 4.5 hours of high-definition video or more than 20 hours of standard video. And there are even plans in the works to develop a disc with twice that amount of storage.

1.2 Why the name Blu-ray?

The name Blu-ray is derived from the underlying technology, which utilizes a blue-violet laser to read and write data. The name is a combination of "Blue" and optical ray "Ray". According to the Blu-ray Disc Association, the spelling of "Blu-ray" is not a Mistake. The character "e" is intentionally left out because a daily-used term can't be registered as a trademark.

1.3 Who developed Blu-ray?

The Blu-ray Disc format was developed by the Blu-ray Disc Association 1BDA),a group of leading consumer electronics and PC companies with more than 130 members from all over the world. The Board of Directors currently consists of:

Apple Computer

Inc. Dell Inc.

Helewlett Packard Company

Hitachi Ltd.

LG Electronics Inc.

Matsushita Electric Industrial Co. Ltd.

Mitsubishi Electric Corporation

Pioneer Corporation

Royal-Philips

Electronics

Samsung Electronics Co. Ltd

Sharp Corporation

Sony Corporation

Corporation

Thomson

Multimedia Walt

Disney Picture

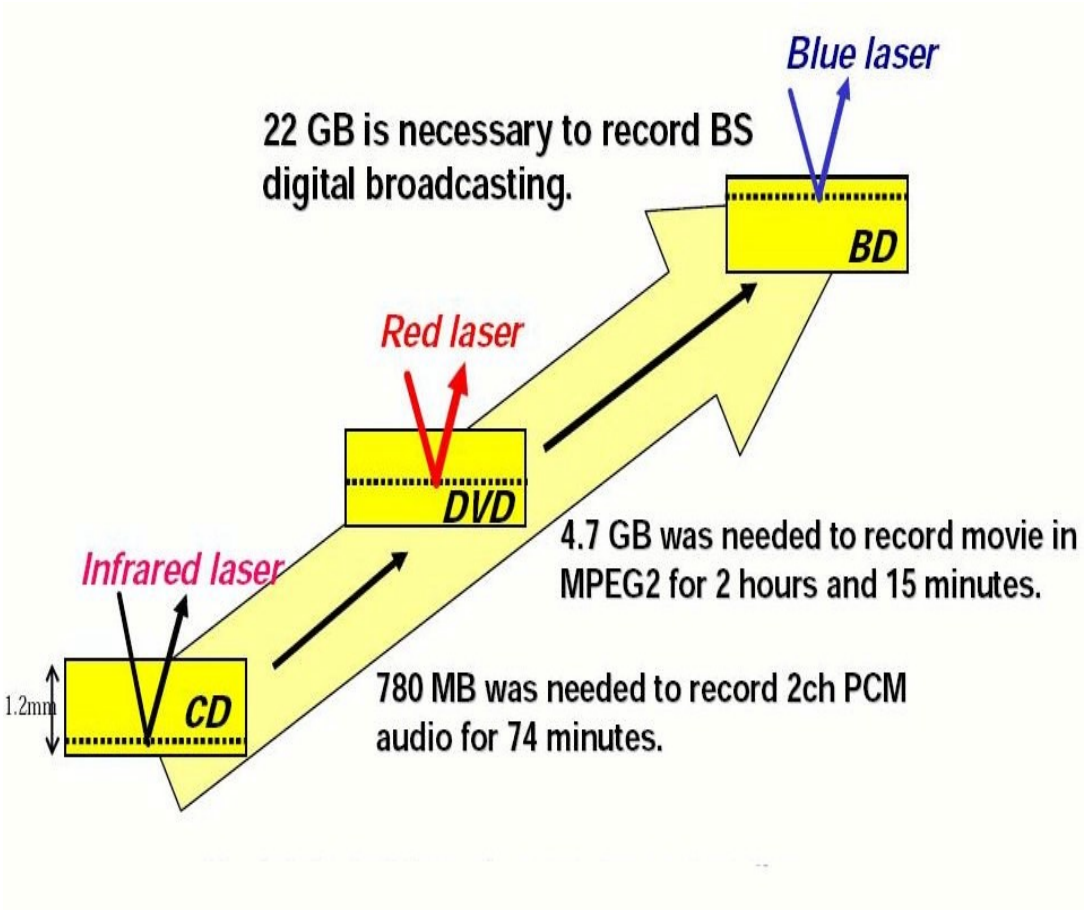
CHAPTER –2

BLU-RAY TECHNOLOGY

2.1 INTRODUCTION TO BLU-RAY TECHNOLOGY

The Objective of Blu-ray The standards for 12-cm optical discs, CDs, DVDs, and Blu-ray rewritable discs (BD-RE Standard) were established in 1982, 1996, and 2002,respectively. The recording capacity required by applications was the important issue when these standards were decided (See fig). The requirement for CDs was 74 minutes of recording 2-channel audio signals and a capacity of about 800 MB. For DVDs, the requirement as a videodisc was the recording of a movie with a length of two hours and fifteen minutes using the SD(Standard Definition) with MPEG-2 compression. The capacity was determined to be 4.7 GB considering the balance with image quality.

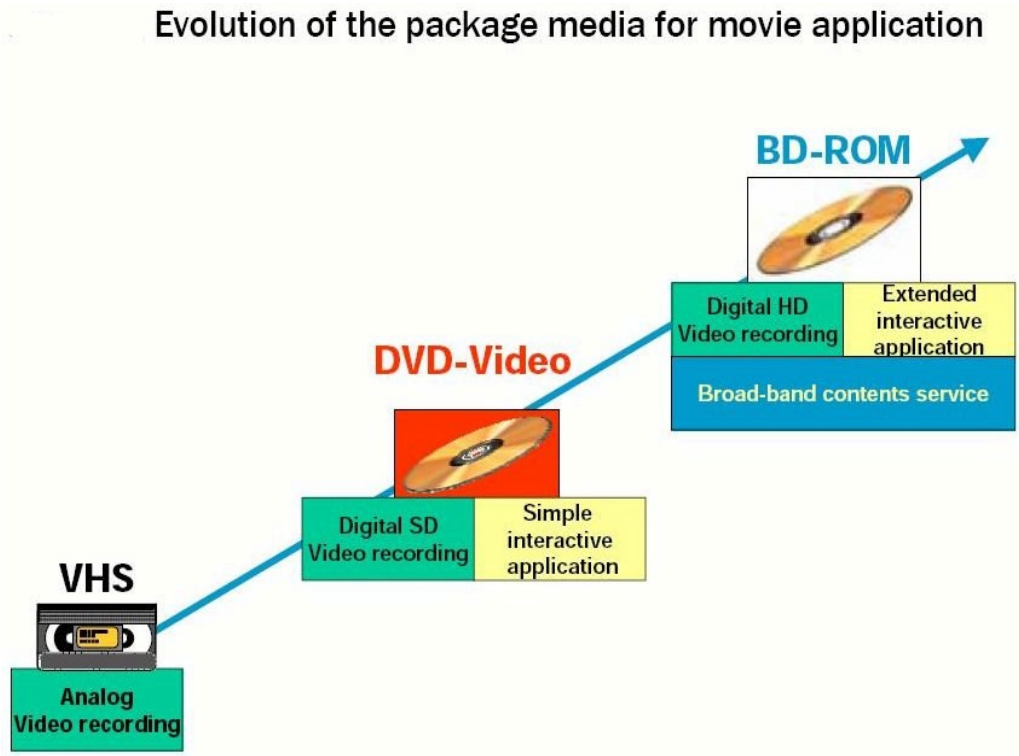
In the case of the Blu-ray *1) Disc, abbreviated as BD hereafter, a recording of an HDTV digital broadcast greater than two hours is needed since the BS digital broadcast started in 2000 and terrestrial digital broadcast has begun in 2003. It was a big motivation for us to realize the recorder using the optical disc. In a DVD recorder, received and decoded video signals are compressed by an MPEG encoder and then recorded on the disc. To record in the same fashion for an HDTV broadcast, an HDTV MPEG-2 encoder is required. However, such a device for home use has not yet been produced. In the case of BS digital broadcasts, signals are sent as a program stream at a fixed rate, which is 24 Mbps for one HDTV program. In the program stream of BS digital broadcast there is a case that the additional data stream is multiplexed, and it is desirable to record and read the data as is. Two hours of recording requires a recording capacity of 22 GB or more. This capacity is about 5 times that of DVDs, which cannot achieve this capacity by merely increasing their recording density.



To obtain this capacity we have developed a number of techniques such as: employing a blue-violet laser, increasing the numerical aperture of objective lens, making the optical beam passing substrate thin, 0.1 mm, and evenly thick, using an aberration compensation method of pickup adapted to the substrate thickness and dual layer discs, improving the modulation method, enhancing the ability of the error correction circuit without sacrificing the efficiency, employing the Viterbi decoding method for reading signals and improving the S/N ratio and the inter symbol interference, using the on-groove recording and highly reliable wobbling address system, developing high speed recording phase change media, etc. In addition, the convenient functions of a recording device have also been realized in the application formats.

These techniques are described in this paper. Furthermore, the key concepts of the Blu-ray standard such as the reason for

employing 0.1 mm thick transparent layer and a dual layer recording disc will be described in each dedicated chapter. Following the rewritable system, the planning of a read-only system and write-once system has already started. In addition to high picture quality, the introduction of core and new functions is indispensable for the spread of the next generation package media. For example, during the switch from VHS to DVD, digital recording and interactive functions were newly introduced. Consequently, it is anticipated that the specifications of BD-ROM will provide a high performance interactiveness and a connection to broadband services, reflecting the demands of the movie industry (Fig).



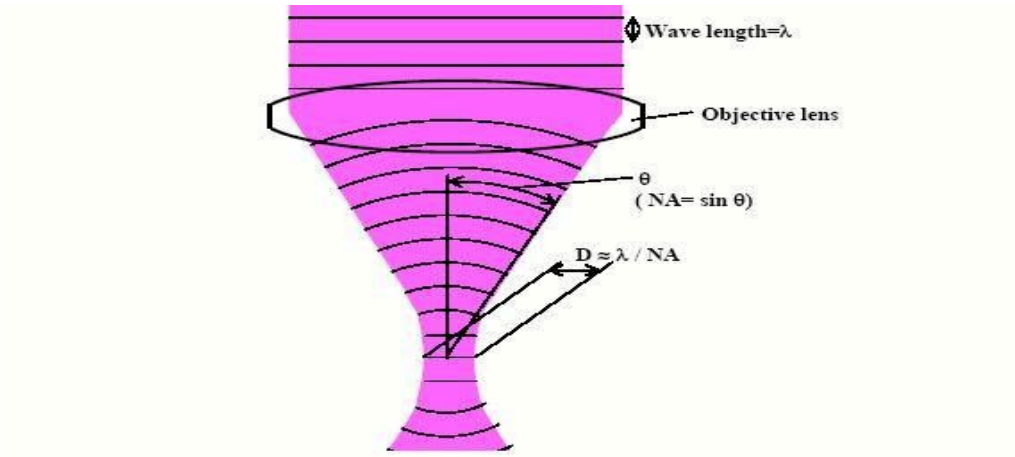
2.2OPTIMIZATION OF THE COVER LAYER THICKNESS

Roots of a 1.2 mm substrate existed in the video disc. One of advantages of laser discs has been that they are hardly affected by dirt or dust on the disc surface since information is recorded and read through a cover layer. The first commercial optical disc, which was the videodisc called VLP or Laser Disc, used a 1.2

mm thick transparent substrate, through which information was read. This thickness was determined from conditions such as: - Deterioration of the S/N ratio due to surface contamination was suppressed to a minimum since it used analog recording,

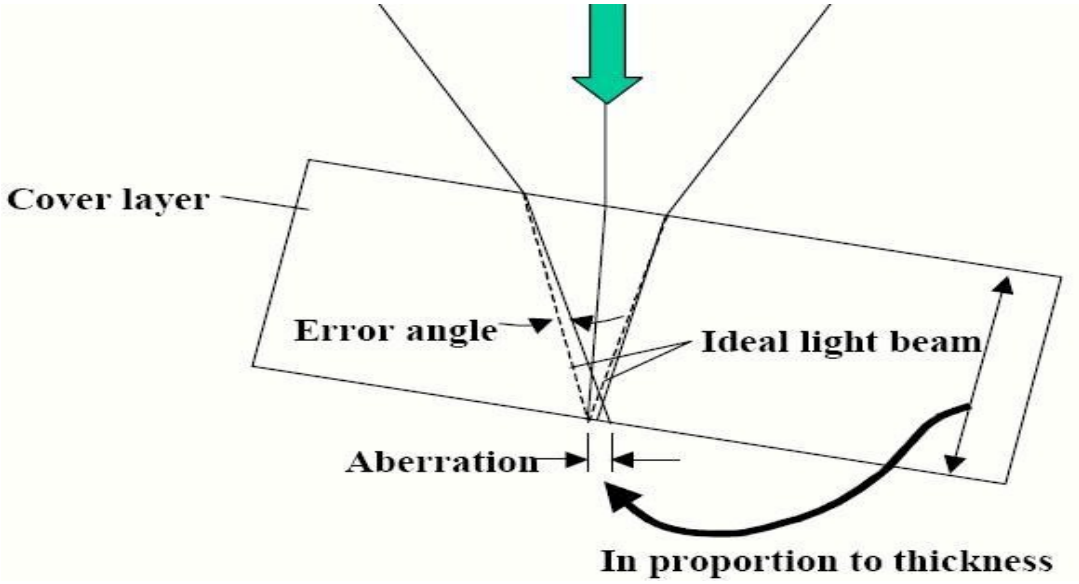
- A disc of 30 cm in diameter can be molded,
- The disc has sufficient mechanical strength,
- The disc is as thin as possible while satisfying the flatness and optical uniformity.

The last condition is because the thinner the cover layer, the more easily the performance of the objective lens to converge the laser beam can be improved. This convergence performance of the objective lens is expressed by what we call NA (Numerical Aperture), and the diameter of a converging light is inversely proportional to NA (Fig. 1.2.1). Thus NA is required to be as large



as possible. However, when the optical ax is of the objective lens shift from the perpendicular to the disc surface, a deterioration of the convergence performance (aberration) occurs and its amount grows proportionally to the cube of NA. Since we cannot avoid discs from tilting to some extent from the optical axis of the objective lens due to the bending of discs or inclination of the mounting, and it has prevented the value of NA from increasing. NA-Numerical Aperture is defined as sin ( ). Where is half angle of

converging light converged by an objective lens. Around 80% of light energy is converged in an area with diameter of/ NA On the other hand, an aberration caused by a disc inclination is proportional to the thickness of the cover layer. This aberration was originate in a of the refraction angle error at the cover layer interface resulting from the disc inclination. Further, the amount of blur in the beam spot due to the refraction angle error is proportional to the distance between the disc surface and the focal point as shown below.



When the disc tilts refraction angle error, which is deviation from ideal angle to form an ideal light spot, occurs at the disc surface. This refraction angle error causes aberration at the focal point. Then the aberration is in proportion to the distance between disc surface and the focal point, i.e., the aberration is in proportion to thickness of cover layer.

2.3 LASER TECHNOLOGY

The technology utilizes a "blue" (actually blue-violet) laser diode operating at a wavelength of 405 nm to read and write data. Conventional DVDs and CDs use red and infrared lasers at 650 nm and 780 nm respectively. As a color comparison, the visible color of a powered fluorescent black light tube is dominated by mercury's bluish violet emissions at 435.8 nm. The blue-violet laser diodes

used in Blu-ray Disc drives operate at 405 nm, which is noticeably more violet (closer to the violet end of the spectrum) than the visible light from a black light. A side effect of the very short wavelength is that it causes many materials to fluoresce, and the raw beam does appear as whitish-blue if shone on a white fluorescent surface (such as a piece of paper). While future disc technologies may use fluorescent media, Blu-ray Disc systems operate in the same manner as D and DVD systems and do not make use of fluorescence effects to read out their data.

The blue-violet laser has a shorter wavelength than CD or DVD systems, and this shrinking makes it possible to store more information on a 12 cm (CD/DVD size) disc. The minimum "spot size" that a laser can be focused is limited by diffraction, and depends on the wavelength of the light and the numerical aperture (NA) of the lens used to focus it. By decreasing the wavelength (moving toward the violet end of the spectrum), using a higher NA (higher quality) dual-lens system, and making the disk thinner (to avoid unwanted optical effects), the laser beam can be focused much tighter at the disk surface. This produces a smaller spot on the disc, and therefore allows more information to be physically contained in the same area. In addition to optical movements, Blu-ray Discs feature improvements in data encoding, closer track and pit spacing, allowing for even more data to be packed in.

2.3.1 DIODE

A laser diode is a laser where the active medium is a semiconductor p-n junction similar to that found in a light-emitting diode. Laser diodes are sometimes referred to (somewhat redundantly) as injection laser diodes or by the acronyms LD or ILD.

(a) PRINCIPAL OF OPERATION

When a diode is forward biased, holes from the p-region are injected into the n-region, and electrons from the n-region are injected into the p-region. If electrons and holes are present in the same region, they may radioactively recombine—that is, the electron "falls into" he hole and emits a photon with the energy of the band gap. This is called spontaneous emission, and is the main source of light in a light-emitting diode. Under suitable conditions, the electron and the hole may coexist in the same area for quite some time (on the order of microseconds) before they recombine. If a photon f exactly the right frequency happens along within this time period, recombination may be stimulated by the photon. This causes another photon of the same frequency to be emitted, with exactly the same direction, polarization and phase as the first photon.

In a laser diode, the semiconductor crystal is fashioned into a shape somewhat like a piece of paper—very thin in one direction and rectangular in the other two. The of the crystal is n-doped, and the bottom is p-doped, resulting in a large, flat p-n junction .The two ends of the crystal are cleaved so as to form a perfectly smooth, parallel edges; two reflective parallel edges are called a Fabry-Perot cavity. Photons emitted in precisely the right direction will be reflected several times from each end face before they are emitted. Each time they pass through the cavity, the light is amplified by stimulated emission. Hence, if there is more amplification than loss, the diode begins to "lase"

(b) TYPES OF LASER IODES

(i) Double heterostructure lasers

In these devices, a layer of low band gap material is sandwiched between two high band gap layers. One commonly used pair of materials is GaAs with AlGaAs. Each of the junctions between

different band gap materials is called a heterostructure, hence the name "double heterostructure laser" or DH laser. The kind of laser diode described in the first part of the article is referred to as a "homojunction" laser, for contrast with these more popular devices. The advantage of a DH laser is that the region where free electrons **and** holes
exist simultaneously—the "active" region—is confined to the thin middle layer. This means that many more of the electron-hole pairs can contribute to amplification—not so many are left out in the poorly amplifying periphery. In addition, light is reflected from the heterojunction; hence, the light is confined to the region where the amplification takes place.

ii) Quantum well lasers

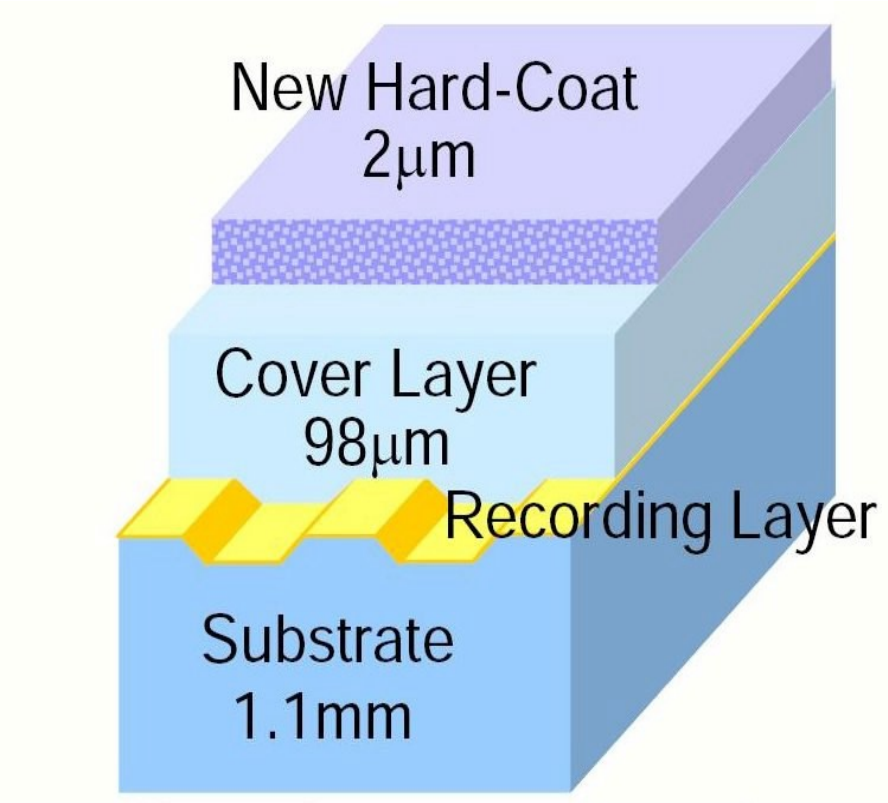
If the middle layer is made thin enough, it starts acting like a quantum well. This means that in the vertical direction, electron energy is quantized. The difference between quantum well energy levels can be used for the laser action instead of the band gap. This is very useful since the wavelength of light emitted can be tuned simply by altering the thickness of the layer. The efficiency of a quantum well laser is greater than that of a bulk laser due to a tailoring of the distribution of electrons and holes that are involved in the stimulated emission (light producing) process.

The problem with these devices is that the thin layer is simply too small to effectively confine the light. To compensate, another two layers are added on, outside the first three. These layers have a lower refractive index than the center layers, and hence confine the light effectively. Such a design is called a separate

confinement heterostructure (SCH) laser diode. Almost all commercial laser diodes since the 1990s have been SCH quantum well diodes

2.4 HARD-COATING TECHNOLOGY

The entry of TDK to the BDF (as it was then), announced on 19 March 2004,was accompanied by a number of indications that could significantly improve the outlook for Blu-ray. TDK



Is to introduce hard-coating technologies that would enable bare disk (caddy less) handling, along with higher-speed recording heads and multi-layer recording technology (to increase storage densities).TDK's hard coating technique would give BDs scratch resistance and allow them to be cleaned of fingerprints with only a tissue, a procedure that would leave scratches on current CDs and DVDs.

2.5 CONTRIBUTION OF HIGH TO THE LARGE CAPACITY

Like the BD-RE system, the pick up head for BD-ROM uses a high numerical aperture (NA) lens of 0.85 and a 405 nm blue laser. In early BD-RE systems the high NA was realized by Using 2 lenses in combination. Today many single lenses with working distance larger than 0.5mm have been developed, and even lenses which can be used in DVD/BD compatible pick ups and CD/DVD/BD compatible pick ups have been developed.

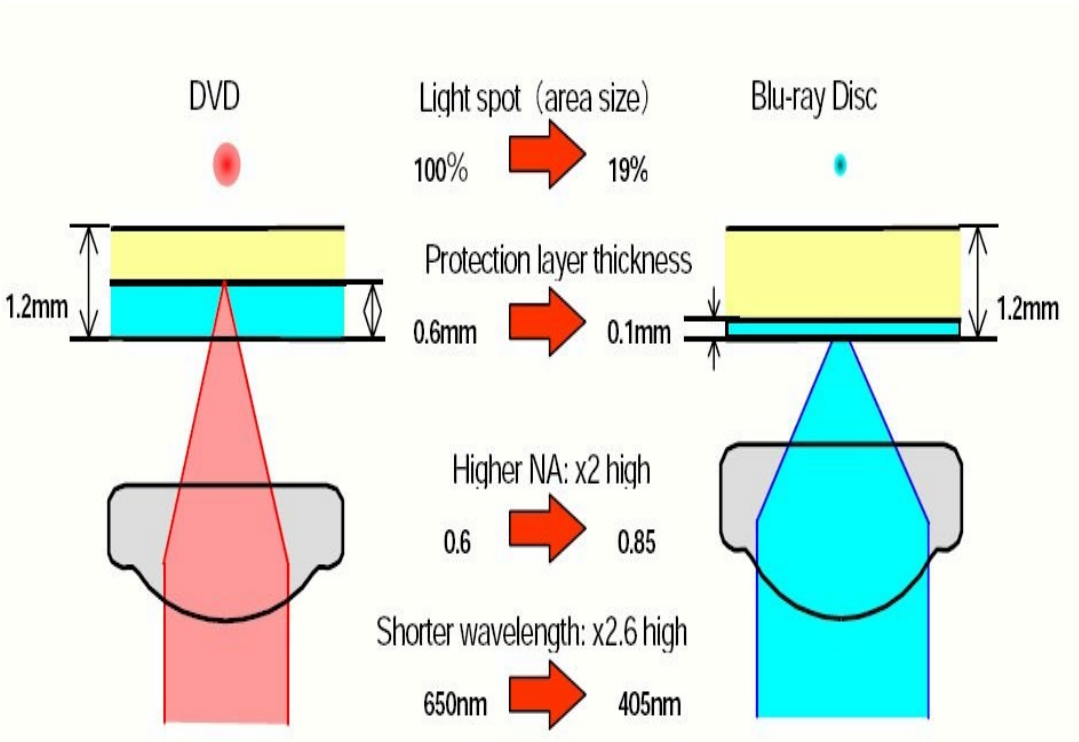
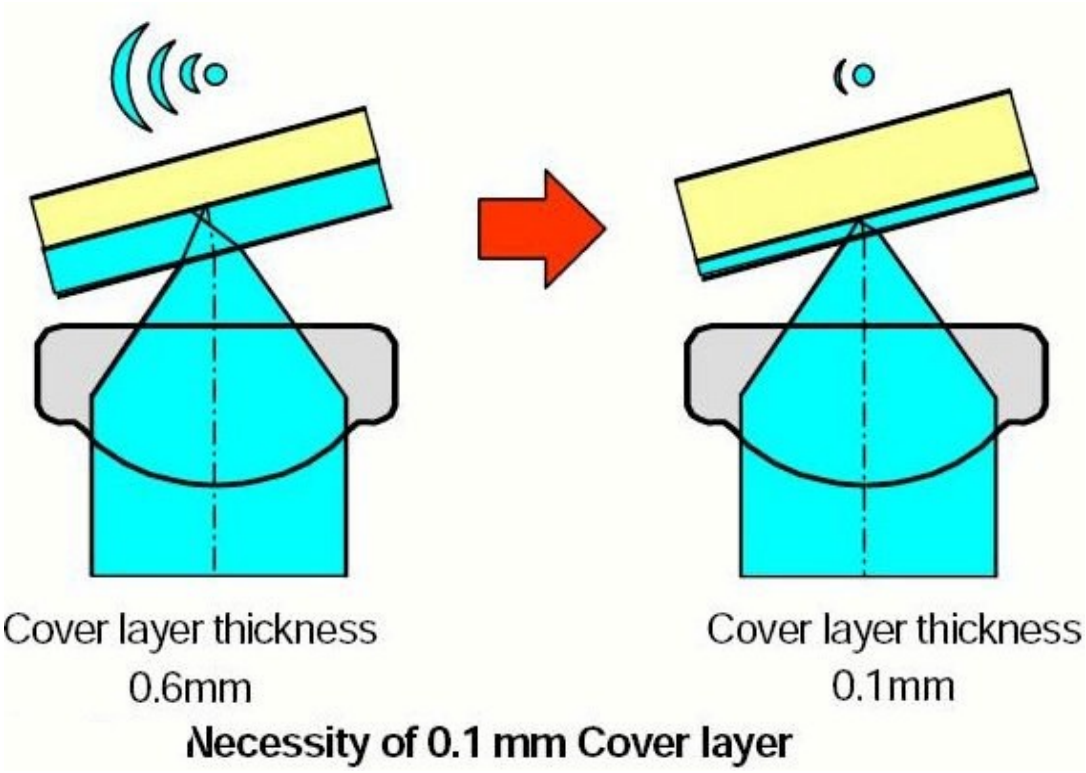


Fig: High capacity contribution

Figure shows that the high NA lens increases the areal density by 2 times while the blue laser contributes an additional factor of 2.6 times compared to the areal density of DVD. In total, the Blu-ray spot size is less than 1/5 that of DVD, resulting in more than 5 times the capacity of DVD. Figure2-3 shows the optical beam degradation due to the disc tilt. This degradation is proportional to NA3 and the thickness of the cover layer. We selected 0.1 mm as the thickness of the cover layer, achieving more than +- 1.60 deg for the radial tilt margin for BD-ROM, which is similar to that of DVD-ROM.



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DISC STRUCTURE

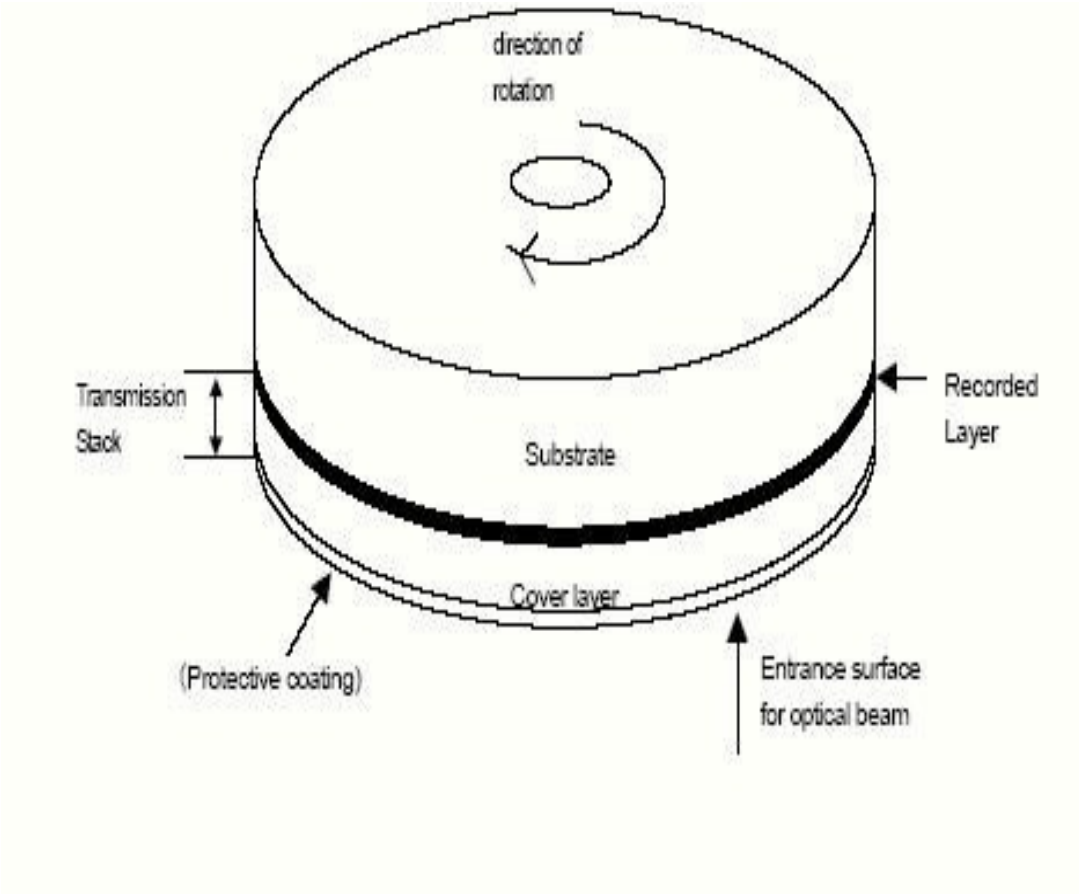
2.6 Configuration of SL and DL Discs

Figure shows the outline of a Single Layer BD Read-Only disc and Figure shows the outline of a Dual Layer BD Read-Only disc. To improve scratch resistance, the cover layer can optionally be protected with an additional hard coat layer. One of the features that differentiate Blu-ray Disc from DVD recording systems is the position of the recording layer within the disc.

For DVD, the recording layer is sandwiched between two 0.6-mm thick layers of plastic – typically polycarbonate. The purpose of this is to shift surface scratches, fingerprints and dust particles to a position in the optical pathway where they have negligible effect - i.e. well away from the point of focus of the laser. However, burying the recording layer 0.6 mm below the surface of the disc also has disadvantages. Due to the injection molding process used to produce them, disc substrates suffer from stress-induced birefringence, which means that they split the single incident laser light into two separate beams. If this splitting is excessive, the drive cannot read data reliably from the disc.

Consequently, the injection molding process has always been a very critical part of CD and DVD production. Another critical manufacturing tolerance, particularly for DVDs, is the flatness of the disc, because the laser beam becomes distorted if the disc surface is not perpendicular to the beam axis - a condition referred to as disc tilt. This distortion increases as the thickness of the cover layer increases and also increases for higher numerical To overcome these disadvantages, the recording layer in a Blu-ray Disc sits on the surface of a 1.1-mm thick plastic substrate, protected by a 0.1-mm thick cover layer.

With the substrate material no longer in the optical pathway, birefringence problems are eliminated. In addition, the closer proximity of the recording layer to the drive's objective lens reduces disc tilt sensitivity. This only leaves the problem of surface scratching and fingerprints, which can be prevented by applying a specifically

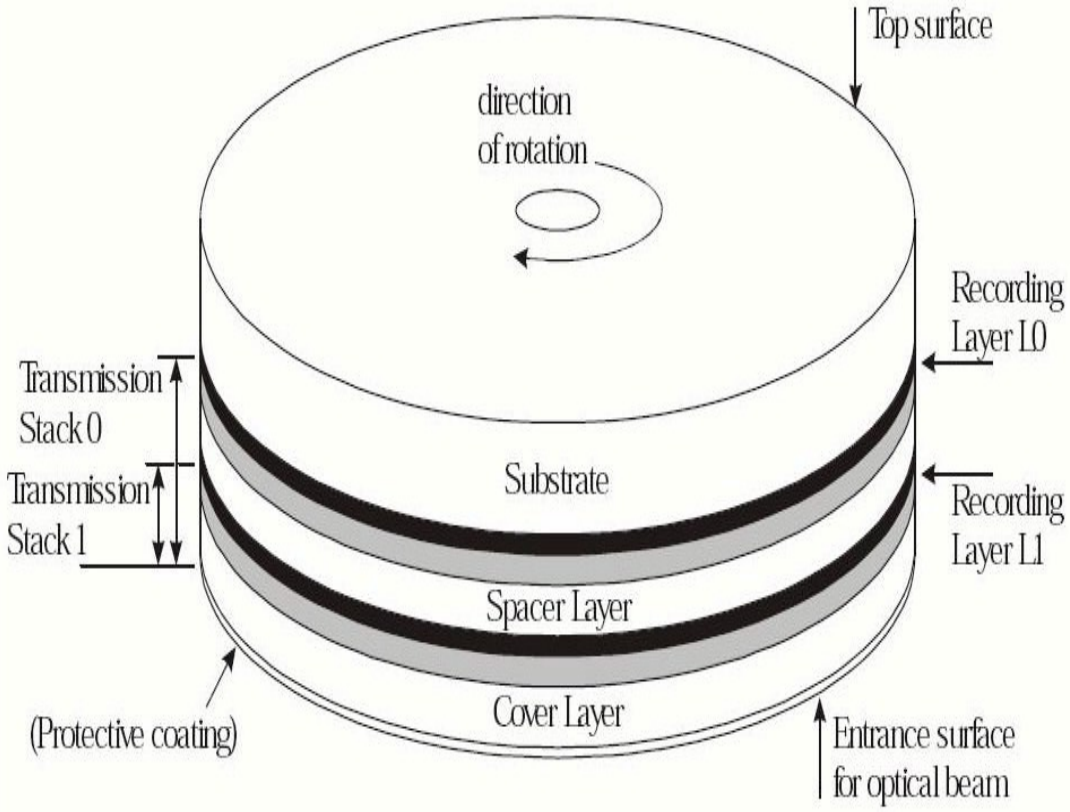


Single –Layer Disc

Dual Layer Disc

Figure shows the outline of a Dual Layer BD Read-Only disc. To improve scratch resistance, the cover layer can optionally be protected

with an additional hard coat layer. The different layers are shown. A spacing layer is used to separate the two information discs. Also The different transmission stack are shown



CHAPTER –3

SPECIFICATION OF BLU-RAY

3.1 TECHNICAL DETAILS

The table below shows the technical specification of Blu-Ray

Recording capacity: 23.3GB/25GB/27GB

Laser wavelength: 405nm (blue-violet laser)

Lens numerical aperture (NA): 0.85

Data transfer rate: 36Mbps

Disc diameter: 120mm 1 .2mm (optical transmittance protection
Disc thickness: layer: 0.1 mm)
Recording format: Phase change recording
Tracking format: Groove recording
Tracking pitch: 0.32um
Shortest pit length: 0.160/0.149/0.138um 2
Recording phase density: 16.8/1 8.0/1 9.5Gbit/inch
Video recording format: MPEG2 video
Audio recording format: AC3, MPEG1, Layer2, etc.
Video and audio: MPEG2 transport stream
Cartridge dimension: Approximately 129 x 131 x 7mm
.

3.2 FORMATS

Unlike DVDs and CDs, which started with read-only formats and only later added recordable and re-writable formats, Blu-ray is initially designed in several different formats:

- **BD-ROM**

(Read-only) - For pre-recorded content
Seminar report on Blu-Ray Disc

- **BD-R** (recordable) - for PC data storage
- **BD-RW** (rewritable) - For PC data storage
- **BD-RE** (rewritable) - For HDTV recording

3.3 DATA RATE

For high-definition movies a much higher data rate is needed than for standard definition. With the BD format's choices for both NA and wavelength we have been able to realize a format with 5X higher data rate while only doubling the rotation rate of DVD-ROM discs. The

following numbers offer a comparison: Data bit length: 111.75 nm (25GB) (267nm for DVD) Linear velocity: 7.367 m/s (Movie application) (3.49 m/s for DVD). User data transfer rate: 53.948 Mbit/s (Movie application) (10.08 Mbps for DVD)

The BD system has the potential for future higher speed drives. The BD-RE (rewritable) standard is now available; to be followed by the BD-R (recordable) and BD-ROM formats in mid-2004, as part of version 2.0 of the Blu-ray specifications. BD-ROM pre-recorded media are to be available by late 2005. Looking further ahead in time, Blu-ray Discs with capacities of 100GB and 200GB are currently being researched, with these capacities achieved by using four and eight layers respectively.

3.4 CODECS

The BD-ROM format will likely include 3 codec's: MPEG-2 (the standard used for DVDs), MPEG-4's H.264/AVC codec, and VC-1 based on Microsoft's Windows Media 9 codec. The first codec only allows for about two hours of storage on a single layer Blu-ray Disc, but with the addition of the latter two more advanced codec's, a single-layer disc can hold almost four hours. High-definition MPEG-2 has a data rate of about 25Mbps , while the latter two have data rates of about I5Mbps for video and 3Mbps for audio. BD-RE (and by extension BD-R) does not currently support any advanced codec beyond MPEG-2. Because MPEG-2 is currently used to broadcast HDTV, recorders write

This HD stream directly to a disc. Since there are no consumer level recorders capable of real-time transcoding from the MPEG-2

used for broadcasting and any other codec that might be used for BD-RE, MPEG-2 is the only format supported by BD-RE.
Encoding methods for the audio stream include Linear PCM, Dolby Digital, DTS and dts++ (loss less compression). The Blu-ray Disc Association is known to be looking into other codec's superior to those supported by the DVD specification.

3.5 VARIATIONS

An 8 cm BD specification has been finalized and approved. A one-sided, single-layer 8 cm BD can hold 15 GB, giving it the capacity of one and a half regular sized (12 cm) single sided double layer DVDs. This would be an ideal format for small, portable devices, such as portable movie players and digital video cameras. A new hybrid Blu-ray / DVD combo disc has been developed by JVC and is awaiting acceptance by the Blu-ray Disc Association. This would allow both normal DVD players and Blu-ray players to utilize the disc. Users would be able to purchase a single disc that can play at either high definition or standard DVD quality, depending on the hardware utilized. Users that do not have a Blu-ray disc player can view the video content at standard definition using their current DVD Player, and enjoy the same content at high definition resolution when upgrading to a Blu-ray disc player in the future.

3.6 COMPATIBILITY

The BDA announced that, while it was not compulsory for manufacturers, Blu-ray lasers and drives are capable of reading the various DVD formats, ensuring backward compatibility. This makes the upgrade more attractive to consumers as it does not require replacing their collections of DVDs.

3.7 RECORDERS

The first Blu-ray recorder was unveiled by Sony on March 3, 2003, and was introduced to the Japanese market in April that year. On September 1, 2003, JVC and Samsung Electronics announced Blu-ray based products at DFA in Berlin, Germany. Both indicated that their products would be on the market in 2005. In March 2004,both Sony and Matsushita announced plans to ship 50 GB Blu-ray recorders the same year. The Matsushita product is to ship in July 2004 in the Japanese market under the Panasonic brand. Sony is to follow by the end of 2004 and has announced that the Play station 3 will be shipped with a special Blue-ray drive. Meanwhile, LG Electronics is expected to ship a recorder equipped with a 200GBhard disk into the U.S. Market by Q3 2004. These products are to support single-sided, dual-layer rewriteable discs of 54GB capacity, Sony's machine will also support BD-ROM pre-recorded media, which are expected to be available by Christmas 2005.

CHAPTER-4
CURRENT TECHNOLOGY

\4.1 CURRENT STORAGE DEVICES

Some of the popular storage devices that are available in the market include:

Analog Storage Technology

- VHS

Digital Storage Technology

- Floppy Disc
- Compact Disc (CD)
- Digital Versatile Disc (DVD)

4.2 BLU-RAY Vs VHS

The Blu-ray Disc recorder represents a major leap forward in video recording technology as it enables recording of high-definition television (HDTV). It also offers a lot of new innovative features not possible with a traditional VCR:

• Random access, instantly jump to any spot on the disc

• Searching, quickly browse and preview recorded programs in real-time

• Create play lists, change the order of recorded programs and edit recorded video

• Automatically find an empty space to avoid recording over programs

• Simultaneous recording and playback of video (enables Time slip/Chasing playback)

• Enhanced interactivity enables more advanced programs and games

• Broadband enabled, access web content, download subtitles and extras

• Improved picture, ability to record high-definition television (HDTV)

• Improved sound, ability to record surround sound (Dolby Digital, DTS, etc)

4.3 BLU-RAY Vs OTHER STORAGE DEVICES

The storage capacity of different digital storage technology varies a lot. A usually used version of floppy disc has a capacity of 1.44MB while that of a CD is 700 MB & for DVD it is 4.7 GB. Also they have varying shell lives out of these DVD has the maximum. A DVD is very similar to a CD, but it has a much larger data capacity. A standard DVD holds about seven times more data than a CD does. This huge capacity means that a DVD has enough room to store a full-length, MPEG-2-encoded movie, as well as a lot of other Information. DVD can also be used to store almost eight hours of CD-quality music per side. DVD is composed of several layers of plastic, totaling about 1.2 millimeters thick. Each layer is created by injection molding polycarbonate plastic.

COMPARISON OF BD AND DVD

Parameters	BD-ROM	DVD-ROM
Storage capacity (single-layer)	25GB	4.7GB
Storage capacity (dual-layer)	50GB	9.4GB
Laser wavelength	405nm	650nm
Numerical aperture (NA)	0.85	0.60
Protection layer	0.1mm	0.6mm
Data transfer rate (1x)	36.0Mbps	11.08Mbps

A disc in the DVD format can currently hold 4.7 gigabytes of data. Unlike DVD technology, which uses red lasers to etch data onto the disc, the Blu-ray disc technology uses a blue-violet laser to record information. The blue-violet laser has a shorter wavelength than the red lasers do, and with its smaller area of focus, it can etch more data into the . The digital information is etched on the discs in the form of microscopic pits. These pits are arranged in a continuous spiral track from the inside to the outside. Using a red laser, with 650 nm wavelength, we can only store 4.7 GB on a single sided DVD. TV recording time is only one hour in best quality mode, and two, three or four hours with compromised pictures. Data capacity is inadequate for non-stop backup of a PC

hard drive. The data transfer rate, around 10 Mbps, is not fast enough for high quality video.

CHAPTER-5

NEXT GENERATION TECHNOLOGIES

5.1 BLU-RAY Vs HD-DVD

Next generation optical disc format developed by Toshiba and NEC. The format is quite different from Blu-ray, but also relies heavily on blue-laser technology to achieve a higher storage capacity. The read-only discs (HD DVD-ROM) will hold 15GB and 30GB, the rewritable discs (HD DVD-RW) will hold 20GB and 32GB, while the recordable Discs (HD DVD-R) won't support dual-layer discs, so they will be limited to 15GB. The format is being developed within the DVD Forum as a possible successor to the current DVD technology.

5.2 UPCOMING OF RIVALS

The technology is proven, but that's no guarantee of a smooth migration Already, a standards war much like those that have broken out over every major medium since the videocassette is threatening this latest optical innovation. The nine electronics companies, led by Sony, Pioneer, and Matsushita Electric Industrial, unveiled a standard format dubbed the Blu-ray Disc, which incorporates blue-violet laser technology and sets the recording capacity of the disks between 23 and 25 gigabytes per side. Within the prototypes of lasers that meet the requirements.

5.3 HD DVD AS A CONTESTEE

The group (BDF), however, faces competition on several fronts. On one side stands Toshiba Corp, which has refused to endorse the Blue-ray Disc. That's troubling because in the early 1990s, Toshiba led the alliance of electronics and film companiesthat produced the standard for today's DVD systems, trouncing a competing effort by Sony and Royal Philips Electronics of the Netherlands. Earlier this year, Toshiba, which Seminar report on Blu-Ray Disc continues to head the DVD Forum, demonstrated its own rewritable optical disk, boasting a capacity of 30 GB per side. And Toshiba is not the only holdout: Mitsubishi Electric and AOL Time Warner, both important members of the DVD Forum, have yet to join the Blue-ray Disc group.

The Toshiba is developing another kind of disc using the BLUE LASER Technology under name AOD (Advanced Optical Disc) more popularly known as HD DVD (High Definition DVD).And this technology is also backed up by the DVD Forumsimilar to the BDF

Toshiba has developed an alternative version and NEC and a provisional specification approved by the DVD Forum. The original name was AOD (AdvancedOptical Disc).
side There are three versions in development.

1. HD DVD-ROM discs are pre-recorded and offer a capacity of 15 GB per layer . These can be used for distributing HD movies.
2. HD DVD-RW discs are re-writable and can be used to record 20 GB per side for re- writable versions.
3. HD DVD-R discs are write-once recordable format discs with a capacity of 15 GB per side.

Like Blu-ray discs they need a blue laser of 405 nm wavelength, but are physically similar to DVD discs, as they use a cover layer of 0.6 mm. Therefore HD DVD discs can be manufactured using existing DVD lines, and existing UV mastering equipment.

5.4 COMPARISON OF FORMATS

The following table provides a comparison of the two formats . It is not yet clear which format will win. Blu-ray currently seems to have the most support, but HD DVD presents fewer manufacturing problems, particularly for pre-recorded versions. HD DVD canbe mastered and replicated with current equipment, while Blu-ray requires new equipment and processes for both.

PARAMETERS	BD	BD	HD-DVD	HD-DVD
Storage capacity	**25GB**	**50GB**	**15GB**	**30GB**

Number of layers	**Single layer**	**Dual layer**	**Single layer**	**Dual layer**
Laser wavelength	**405nm**	**405nm**	**405nm**	**405nm**
Numerical aperture	**0.85**	**0.85**	**0.65**	**0.65**
Protection layer	**0..l mm**	**0.l mm**	**0.6mm**	**0.6mm**
Data transfer rate	**54.0Mbps**	**54.0Mbps**	**36.5Mbps**	**36.5Mbps**
Video compression	**MPEG-2** **MPEG-4** **AVC** **VC-1**	**MPEG-2** **MPEG-4** **AVC** **VC-1**	**MPEG-2** **AVC** **MPEG-4**	**MPEG-2** **AVC** **MPEG-4**

CHAPTER 6
LOOKING FORWARD

Sony currently has plans for at least three generations of Professional Disc products, with the goal of doubling capacity and performance with each release. The second-generation discs are expected sometime in 2005, featuring 50GB of storage capacity on a single- sided, double-layer disc with a transfer rate of 18MB per second. The company plans to release third-generation discs in 2007, with a projected storage capacity of 100GB using double-sided media and offering a transfer rate of 36MB per second The 25 GB capacity will ncrease later to 50GB, thanks to dual layer discs, proposed by Panasonic. The Blu-Ray group is still discussing

whether the disc can be naked or must be housed in a protective cartridge. Existing CD and DVD players and recorders will not be able to use Blu-Ray discs. New Blu-Ray players will need infra-red, red and blue lasers if they are also to play all kinds of CD and DVD recordings.

According to industry analysts (In-Stat/MDR) "The EL6900C and the Blu-Ray disc recording standard will meet the surging demand for increased disc-based video and data recording capacity. We project this new technology will propel the DVD rewritable market to 62 million units worldwide in 2006 and Intersil is paving the way with its new drivers" Sony will target commercializing the newly developed 3-wavelength optical head within 2 years, and will positively promote to further technology development. By doing so, in addition to further reducing the number of parts used for achieving smaller size of optical heads, enhancement of productivity and reliability will be achieved.

CHAPTER-7

CONCLUSION

Anyone old enough to recall fond memories of Rubik's Cubes, Family Ties, and Duran Duran likely remembers another '80s phenomenon: the VHS vs. Betamax war. The two competing video-recording technologies emerged together in the 1970s, when Sony's (NYSE: SNE) Betamax VCR, a pioneer in the industry, fought for market share against a rival VHS version developed by Matsushita (NYSE: MC). VHS technology quickly gained widespread acceptance, while Betamax followed a divergent path into obscurity. In 1988, with less than 5% of the market, Sony finally threw in the towel by announcing plans to market a VHS-based recorder. While

the end came slowly, the decision would prove to be a death knell for the Betamax name. Fast-forward to today. The growing popularity of high-definition television (HDTV) has fostered a new wave of recording technology, soon to supplant the VCR, and possibly even DVD. Again, two competing technologies are vying for acceptance, but this time Sony appears to be on the winning side.

The Blu-ray Disc Founders (not to be confused with the effusively painted Blue Man Group) is a consortium of 13 leading electronics firms. It has developed a superior optical disc known as the Blu-ray Disc (BD). As opposed to the red lasers currently used to produce DVDs, blue beams have a shorter wavelength, allowing for enhanced precision and more tightly compressed data. While a typical DVD holds 4.7 GB of information, a BD contains 25 GB - enough storage for two hours of HDTV or 13 hours of standard television. Dual-layer discs under development will hold an astounding 54 GB. Aside from greater storage capacity, Blu-ray discs will also contain more interactive features. The world's two foremost computer manufacturers, Hewlett-Packard (NYSE: HPQ) and Motley Fool Stock Advisor holding Dell Computer (NASDAQ: DELL), were formally added to the Blu-ray alliance, virtually ensuring the future adoption of BD technology for PC data storage. The competing format, known as HD-DVD, is simultaneously under joint development by Toshiba and NEC. Though HD-DVD technology appears to be an underdog at this point, it has recently gained notoriety by winning the support of the DVD forum, a confederation of DVD-related companies.
Blu-ray, has already earned an early endorsement from Columbia TriStar Pictures (Hollywood), which has committed to using the Blu-ray technology. Though BDs are not yet mainstream, and pro forma revenue projections are still being formulated, the technology is moving quickly.

The Sony BDZ-S77, a BD recorder, is already on the shelves in HDTV-dominated Japan, and LG Electronics intends to introduce its brand to U.S. consumers as early as the third quarter of this year. Further, with consumers clamoring for faster transfer speeds and storage capacity (two

of the more notable advantages of BD technology), it's possible that the industry is headed to a point where BD sales will one day outstrip DVDs. It's too early to call the game just yet, but this will be an interesting technological development to follow.

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