

Blu-ray Disc (abbreviated as BD) is an optical disc storage medium designed to supersede the standard DVD format. Blu-ray discs not only have more storage capacity than traditional DVDs, but they also offer a new level of interactivity. Users will be able to connect to the Internet and instantly download subtitles and other interactive movie features. With Blu-ray, you can also:

Instantly skip to any spot on the disc

Record one program while watching another on the disc

Edit or reorder programs recorded on the disc

Automatically search for an empty space on the disc to avoid recording over a program

While current optical disc technologies DVD rely on a red laser to read and write data, the new format uses a blue-violet laser instead, hence the name Blu-ray. Despite the different type of lasers used, Blu-ray products can easily be made backwards compatible with CDs and DVDs through the use of a BD/DVD/CD compatible optical pickup unit. A blue laser has a shorter wavelength (405 nanometers) than a red laser (650 nanometers). The smaller beam focuses more precisely, enabling it to read information recorded in pits (You must know that optical discs store information in the form of pits and trenches) that are only 0.15 microns (μm) long - this is more than twice as small as the pits on a DVD. Plus, Blu-ray has reduced the track pitch from 0.74 microns to 0.32 microns. The smaller pits, smaller beam and shorter track pitch together enable a single-layer Blu-ray disc to hold more than 25 GB of information - about five times the amount of information that can be stored on a DVD.

Not only the size of beams etc have reduced, but also there is a slight change in structure of the discs. In a DVD, the data is sandwiched between two polycarbonate layers, each 0.6-mm thick. Having a polycarbonate layer on top of the data can cause a problem called birefringence, in which the substrate layer refracts the laser light into two separate beams. If the beam is split too widely, the disc cannot be read. Also, if the DVD surface is not exactly flat, and is therefore not exactly perpendicular to the beam, it can lead to a problem known as disc tilt, in which the laser beam is distorted.

The Blu-ray disc overcomes this issue by placing the data on top of a 1.1-mm-thick polycarbonate layer. Having the data on top prevents birefringence and therefore prevents readability problems. And, with the recording layer sitting closer to the objective lens of the reading mechanism, the problem of disc tilt is virtually eliminated. Because the data is closer to the surface, a hard coating is placed on the outside of the disc to protect it from scratches and fingerprints.

Further, Blu-ray discs only do the injection-molding process on a single 1.1-mm disc, which reduces cost. That savings balances out the cost of adding the protective layer, so the end price is no more than the price of a regular DVD.