SATA

SATA stands for **Serial Advanced Technology Attachment or Serial ATA**.
SATA is an **interface that connects various storage devices such as hard disks, optical drives, SSD's, etc to the motherboard**. SATA was introduced in the year 2000 to replace the long-standing PATA (Parallel ATA) interface. We all know, in serial mode, data is transferred bit by bit and in parallel, there are several streams that carry the data. Despite knowing this fact, there is a drawback in PATA. PATA is highly susceptible to outside interferences and hence allows SATA to operate at high speeds than PATA. SATA cables are thinner, more flexible and compact as compared to the PATA cables.
There were several industry groups that began their development in SATA late in the 2000s. It was only in the year 2003 that SATA-IO (SATA International Organization) was formed and it laid out the first SATA specifications.

A SATA controller is a device that is used to connect the computer's motherboard to the storage drives.
SATA operates on two modes –

1. **IDE mode:** IDE stands for Integrated Drive Electronics. This is a mode which is used to provide backward compatibility with older hardware, which runs on PATA, at the cost of low performance.
2. **AHCI mode:** AHCI is abbreviation for Advanced Host Controller Interface. AHCI is a high-performance mode that also provides support for hot-swapping.

Characteristics of SATA

- **Low Voltage Requirement:** SATA operates on 500mV (0.5V) peak-to-peak signaling. This help in promoting a much low interference and crosstalk between conductors.
- **Simplified construction:** PATA cables had 40-pin/80-wire ribbon cable. This was complex in construction. In comparison, SATA had a single 7 pin data cable and a 15 pin power cable. This cable resulted in a higher signaling rate, which translates to faster throughput of data.
- **Differential Signaling:** SATA uses differential signaling. Differential signaling is a technology which uses two adjacent wires to simultaneously the in-phase and

out-of-phase signals. Thus, it is possible to transfer high-speed data with low operating voltage and low power consumption by detecting the phase difference between the two signals at the receiver's end.

- **High data transfer rate:** SATA has a high data transfer rate of 150/300/600 MBs/second. This capability of SATA allows for faster program loading, better picture loading and fast document loading.

Advantages of SATA

- Faster data transfer rate as compared to PATA.
- SATA cable can be of length upto 1 meter, whereas PATA cable can only have length of maximum 18 inches.
- SATA cables are smaller in size.
- Since, they are smaller in size, they take up less space inside the computer and increase the internal air flow. Increased air flow can decrease heat build-up and therefore increases the overall life of computer.
- Most modern computer motherboards today have SATA ports more than PATA ports.
- Low power consumption (0.5V).

Disadvantages of SATA

- Special device drivers are required sometimes to recognize and use the drive. However, a SATA hard drive can behave as a PATA
  drive. This eliminates the need for a specific driver to be installed.
- SATA cable supports only one hard drive to connect at a time, whereas PATA cable allows up to two PATA drives per cable.
- SATA is costlier as compared to PATA.