

## **UNIVERSAL SERIAL BUS (USB)**

The synergy between computers and communication is at the heart of today's information technology revolution. A modern computer system is likely to involve a wide variety of devices such as keyboards, microphones, cameras, speakers, and display devices. Most computers also have a wired or wireless connection to the Internet. A key requirement in such an environment is the availability of a simple, low-cost mechanism to connect these devices to the computer, and an important recent development in this regard is the introduction of the Universal Serial Bus (USB). This is an industry standard developed through a collaborative effort of several computer and communication companies, including Compaq, Hewlett-Packard, Intel, Lucent, Microsoft, Nortel Networks, and Philips.

The USB supports two speeds of operation, called low-speed (1.5 megabits/s) and full-speed (12 megabits/s). The most recent revision of the bus specification (USB 2.0) introduced a third speed of operation, called high-speed (480 megabits/s). The USB is quickly gaining acceptance in the market place, and with the addition of the high-speed capability it may well become the interconnection method of choice for most computer devices.

The USB has been designed to meet several key objectives:

- Provides a simple, low-cost and easy to use interconnection system that overcomes the difficulties due to the limited number of I/O ports available on a computer.
- Accommodate a wide range of data transfer characteristics for I/O devices, including telephone and Internet connections.
- Enhance user convenience through a "plug-and-play" mode of operation

**Port Limitation:-**

The parallel and serial ports described in previous section provide a general-purpose point of connection through which a variety of low-to medium-speed devices can be connected to a computer. For practical reasons, only a few such ports are provided in a typical computer.

**Device Characteristics:-**

The kinds of devices that may be connected to a computer cover a wide range of functionality. The speed, volume, and timing constraints associated with data transfers to and from such devices vary significantly.

A variety of simple devices that may be attached to a computer generate data of a similar nature – low speed and asynchronous. Computer mice and the controls and manipulators used with video games are good examples.

**Plug-and-Play:-**

As computers become part of everyday life, their existence should become increasingly transparent. For example, when operating a home theater system, which includes at least one computer, the user should not find it necessary to turn the computer off or to restart the system to connect or disconnect a device.

The plug-and-play feature means that a new device, such as an additional speaker, can be connected at any time while the system is operating. The system should detect the existence of this new device automatically, identify the appropriate device-driver software and any other facilities needed to service that device, and establish the appropriate addresses and logical connections to enable them to communicate. The plug-and-play requirement has many implications at all levels in the system, from the hardware to the operating system and the applications software. One of the primary objectives of the design of the USB has been to provide a plug-and-play capability.