Universal Serial Bus

What is Universal Serial Bus (USB)?

USB is a high-speed serial data bus that will greatly simplify PC setup and operation by offering system support firmware, which allows 'hot plug and play'. USB is also the latest innovation to reduce costs from the personal computer cost of development as well as after point-of-sale technical support. It is a high speed serial bus scheme which allows up to 127 devices to be interfaced together utilizing 'hot plug' (Plug and Play) technology. USB supports keyboards, mice, telephony equipment, scanners, modems, digital cameras, digital joysticks, some CD-ROM drives, tape and floppy drives.

Historical Overview

The dream of an instantaneous PC interface to connect an extremely high number of peripheral devices without having to install a dedicated card and driver is finally here with USB. Technology measures in personal computers has led to the development of one cohesive serial data bus called USB, or Universal Serial Bus. This one interface will eliminate the individual printer, keyboard, mouse and serial ports.

Benefits

1. Easy Plug and Play for Peripherals

USB allows virtually unlimited PC expansion 'outside the box'. With USB, PC users no longer need to worry about selecting the right serial port, installing expansion cards, or the technical headaches of dip switches, jumpers, software drivers, IRQ (Interrupt ReQuest), DMA channels and I/O addresses.

USB features a 'one-size-fits-all' connector that makes it easy to add and unplug peripherals without ever opening the PC. USB's 'hot insertion and removal' feature makes expansion even easier, because users can add peripherals without turning off their PC. USB allows PCs (and PC users) to connect with an exciting array of new digital imaging peripherals, integrated computer telephony devices and multi-user games.

2. Universal Compatibility

USB is an industry-wide Plug and Play specification that makes it easy to expand PC functionality. Over 400 leading companies, including PC manufacturers and suppliers of telecommunications products, PC peripherals and software, currently support USB. NEC Technologies, along with four other companies including Intel and Microsoft, co-developed the USB specification.

3. Simpler Peripheral Design

By eliminating the need for add-in cards, USB makes peripherals easier to design and manufacture. USB distributes power, so many peripheral devices no longer require separate power supplies. USB technology now makes it easy for PC users to connect and adjust monitors, printers, digital speakers, modems and input devices like graphics tablets, scanners, digital cameras, joysticks and multimedia game equipment.

4. Two Data Rates

USB has two data rates: 12Mbps (12,000,000 million bits per second) for devices requiring increased bandwidth; and 1.5Mbps for lower-speed devices like joysticks, keyboards and game pads. Typical throughput is being estimated at 0.5Mbps.

5. Data Transfer Modes

USB supports four data transfer modes allowing devices to use a communication mode suited to their function.
- ➢ Isochronous mode is used by audio and telephony devices like digital speakers.
- ➢ Asynchronous bulk mode is used for devices with large amounts of data to transfer like printers, scanners and disk drives.
- ➢ Control and Interrupt communications are used by lower speed interface devices like mice, keyboards and joysticks.

6. Tiered-Star Topography

USB uses a 'tiered star topology' which means that some USB devices called USB 'hubs' can serve as connection ports for other peripherals. Only one device needs to be plugged into the PC. Other devices can then be plugged into the hub, creating an endless combination of connections.

7. USB Hubs (Monitors)

USB hubs may be embedded in such devices as monitors, printers and keyboards. Stand-alone hubs could also be made available, providing a handful of convenient USB ports right on the desktop. Hubs feature an upstream connection (pointed toward the PC) as well as multiple downstream ports to allow the connection of additional peripheral devices. Up to 127 devices can be connected together this way.

8. Automatic Configuration

USB host controllers manage and control the driver software and bandwidth (data flow) required by each peripheral connected to the bus. Users don't need to do a thing, because all the configuration steps happen automatically. The USB host controller even allocates electrical power to the USB devices. Like USB host controllers, USB hubs can detect attachments and detachments of peripherals occurring downstream and supply appropriate levels of power to those devices.

9. Electric Power

Since power is distributed through USB cables (with a maximum length of five meters), you no longer need an AC power supply box for many devices. The bottom line is that USB makes it easy to add peripherals to your PC, and that makes your PC more productive and fun to use.

10. Software

Software support for many USB devices is included with Windows 98 in the form of standard device class drivers. This simplifies installation and operation of common devices. Although some devices may require additional vendor supplied drivers.

11. Costs and Availability

Most systems shipping today and in the last year already provide USB as a hardware feature of the system. USB is supported directly by Microsoft Windows 98. USB devices that operate on systems running Windows 98 are also available. Their costs are generally similar to comparable non-USB hardware of the same type. The number and types of available USB devices grows each day.