

## UNIVERSAL SERIAL BUS (USB)

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Today just about every PC comes with Universal Serial Bus or USB ports. Many computers will even have additional USB ports located on the front of the tower. In the late 1990s, a few computer manufacturers started including USB support in their new systems, but today USB has become a standard connection port for many devices such as keyboards, mice, joysticks and digital cameras. USB is able to support and is supported by a large range of products. Adding to the appeal of USB is that it is supported at the operating system level, and compared to alternative ports such as parallel or serial ports, USB is very user-friendly. When USB first started appearing in the marketplace, it was referred to as a plug-and-play port because of its ease of use. Consumers without a lot of technical or hardware knowledge were able to easily connect USB devices to their computer. USB devices can also be used across multiple platforms. USB works on Windows and Mac, plus can be used with other operating systems, such as Linux. [1]

### Why essential USB?

Before USB, connecting devices to your system was often a hassle. Modems and digital cameras were connected via the serial port which was quite slow, as only 1 bit is transmitted at a time through a serial port. While printers generally required a parallel printer port, which is able to receive more than one bit at a time, it receives several bits in parallel. Most systems provided two serial ports and a parallel printer port. If you had several devices, unhooking one device and setting up the software and drivers to use another device could often be problematic for the user.

### Advantages of USB rather than other port

The introduction of USB ended many of the headaches associated with needing to use serial ports and parallel printer ports. USB offered consumers the option to connect up to 127 devices, either directly or through the use of a USB hub. It was much faster since USB supports data transfer rates of 12 Mbps for disk drives and other high-speed throughput and 1.5Mbps for devices that need less bandwidth. Additionally, consumers can literally plug almost any USB device into their computer, and Windows will detect it and automatically set-up the hardware settings for the device. Once that device has been installed you can remove it from your system and the next time you plug it in, Windows will automatically detect it. [2]

### Evolution of USB

USB 1.0 technology was introduced in 1996 and has undergone several iterations, improving in transfer speed with each new standard. The standards are as follows:

- USB 1.0 Low Speed 1.5 Mbits/s
- USB 1.1 Full Speed 12 Mbits/s (1.5 MB/s)
- USB 2.0 High Speed 480 Mbits/s (60 MB/s)
- UBS 3.0 SuperSpeed 5.0 Gbits/s (625 MB/s)

### USB

1x

First released in 1996, the original USB 1.0 standard offered data rates of 1.5 Mbps. The USB 1.1 standard followed with two data rates: 12 Mbps for devices such as disk drives that need high-speed throughput and 1.5 Mbps for devices such as joysticks that need much less bandwidth.

Human interface devices such as keyboards and mice require low bandwidth and can operate with USB 1.0, while subsequent protocols are used for data transfer between computers and peripheral devices such as external hard drives, printers, scanners, fax machines and backup units. Digital cameras, cell phones, personal digital

assistants (PDAs) and game consoles are among the plethora of other electronic devices that also make use of USB.

### USB2x

In 2002 a newer specification USB 2.0, also called Hi-Speed USB 2.0, was introduced. It increased the data transfer rate for PC to USB device to 480 Mbps, which is 40 times faster than the USB 1.1 specification. With the increased bandwidth, high throughput peripherals such as digital cameras, CD burners and video equipment could now be connected with USB. It also allowed for multiple high-speed devices to run simultaneously. Another important feature of USB 2.0 is that it supports Windows XP through Windows update.

### USB 3X

Universal Serial Bus (USB) 3.0 is the latest specification of the USB standard, introduced in August 2008 by a partnership of developers led by Intel. USB 3.0 devices are expected to hit the market in 2009 and 2010. The much speedier protocol allows for data transfer speeds up to 5.0 gigabits per second (Gbits/s), or 625 Megabytes per second (MB/s), about ten times faster than the USB 2.0 protocol. [4]

### Advantages of USB 3.0

With greater demands for transferring larger files at faster speeds, USB 3.0 promises to be a welcome improvement from 2.0 technology. For the first time, USB might not be a bottleneck for data transfer. Internal hard drives could be playing catch-up until "SATA 6Gb/s" (the next generation SATA with transfer rates of 6 gigabits per second) and solid-state drives become widespread. In the meantime, SATA drives with maximum data transfer rates of 300 MB/s (3 Gb/s) will only be half as fast as USB 3.0, assuming it matures to its full theoretical potential. According to Symwave, a semi-conductor business involved in USB 3.0 cable design and production, the technology might max out shy of its rated throughput, falling closer to 250-300 MB/s.

USB 3.0 will be a big improvement. Even homeowners are surpassing the one terabyte boundary, with many at home and at work utilizing external drives for full drive backups. External enclosures using USB 3.0 would reduce backup times considerably, improving productivity and efficiency. Transferring graphic contents from digital movie and camera flash cards is another area where the average person will see a drastic improvement with USB 3.0.

USB 3.0 achieves its high transfer rates by using four additional wires in the data cable for a total of six wires. It supports full-duplex communication, or the ability to send and receive data simultaneously, and is power efficient. Most importantly it is backwards compatible with USB 2.0 devices. However, to achieve 3.0 speeds, a 3.0-compatible device and cable must be used.

USB has become an extremely popular interface, with a reported one billion USB products sold yearly worldwide. If the next generation USB is any indication, it will only become more useful over the next several years. Watch for USB 3.0 products at your local electronics store and satiate your need for speed. [3]

### Certified Wireless USB

As more applications moved on to wireless thereafter, the same group decided to follow the trend by cutting the wire in the latest Certified Wireless USB standard, completed in 2005. And now, we are currently in the pre-WUSB and Super Speed USB era.

The USB Implementers Forum has introduced Certified Wireless USB the newest extension to the USB technology. Wireless USB applies wireless technology to existing USB standards to enable wireless consumers to still use USB devices without the mess of wires and worry of cords. Wireless USB is based on the WiMedia MAC Convergence Architecture, using the WiMedia Alliance's MB-OFDM ultra wideband MAC and PHY. It delivers speeds equivalent to wired Hi-Speed USB, with bandwidths of 480Mbps at 3 meters and 110 Mbs at 10 meters. [5]

### References

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