



Universal Serial Bus

The new standard for connecting peripherals.

A little background

Apple's commitment to making powerful technology simple and accessible means that we're constantly on the lookout for new ways of enhancing our products. Recently, this search led us to adopt a technology that we believe will significantly improve every aspect of our customers' experience with attaching peripherals—making them simple to connect, providing higher performance, and offering greater expandability and a wider selection of devices from which to choose. This advance, named Universal Serial Bus (USB), is already being used in hundreds of new devices, including printers, digital cameras, game pads, joysticks, keyboards and mice, and storage devices.

USB technology is the result of an industry consortium effort. It combines all of the advantages of a multiplatform industry standard, including decreased cost, increased compatibility, and a greater number of available peripherals, with the advantages of a very "Apple-like" blend of advanced functionality and flair. In short, USB meets Apple's key criteria for technology adoption: It's easy, fun, and powerful—and it provides our customers with great new benefits.



Attaching devices through USB is simple. There's only one kind of cable and each end is different, so you can't make a mistake.

The USB advantage

The USB experience is very similar to a Macintosh customer's experience today when plugging in a keyboard and mouse—it just works! Some additional surprises make USB even more fun and easy to use.

- *Simple to connect*—With USB, connecting a device really does mean simply plugging it in. USB connections require no terminator settings or ID numbers, and they don't require users to know about hexadecimal memory addresses or interrupt settings, often required to make peripherals work with Microsoft Windows. Users need only install a device driver (a small piece of software that allows the computer to interact with the device) by dragging its icon onto the System Folder or by running a simple installer application. This need only be done one time. After that, the device is ready to use as soon as it's plugged in. Apple already includes the software drivers for USB keyboards and USB mice (and other pointing devices like trackballs). In the future, USB drivers for other popular devices will be preinstalled, so even more devices will work as soon as you plug them in.

Have you ever been frustrated trying to find an AC power outlet near your computer so you can plug in your favorite peripheral? If you're like most computer users, chances are you have too few outlets. USB addresses this concern too, by offering power to devices through the USB data cable. For example, devices such as removable disk drives and cameras can be connected through a single cable, and receive both power and data. With USB, there are fewer cables to worry about than with other types of devices.



Technology Fact Sheet

Universal Serial Bus

Even the design of USB cables is simple, putting an end to the dizzying array of twisted wiring and bulky cabling that users currently face. There's only one kind of USB cable (sometimes referred to as a "USB A-to-B" cable) with distinctly different connectors at each end, so they can't be plugged in incorrectly.

- *Higher performance*—Apple's focus on ease of use has always enabled Macintosh users to do more, faster. USB devices can transfer data at up to 12 megabits per second—almost 50 times faster than traditional serial connections. Better performance means more fun and increased productivity. For example, USB joysticks can provide faster feedback when playing action games, USB desktop conferencing cameras can provide larger pictures and smoother motion, scanners can scan faster, and graphics tablets can track pen movements more accurately. Increased performance also means you can do things you couldn't do using serial ports, such as attaching mass-storage devices and in the future, even digital speakers and microphones.*



*USB offers great performance. It's over 1,000 times faster than the Apple Desktop Bus (ADB) and over 50 times faster than previous Macintosh serial ports.

- *Devices on demand*—With USB, users can plug in or unplug a device at any time, as needed, without ever having to adjust hardware settings or even turn off the computer. This capability, known as "hot-plug" and "hot-unplug," is a radical new way to use devices with Macintosh. For example, a user engaged in producing a newsletter or illustrated report could easily swap out a digital camera for a printer—without experiencing any inconvenient downtime. Users can share their devices with a friend or colleague without stopping their work, and because USB is industry standard, the same device can be used on another Macintosh with USB, or even a PC compatible.
- *Greater expandability*—In the past, expansion was limited to the number of ports built into the computer. But, because you can plug in and unplug USB devices anytime, there's always room to connect the peripheral you need. If an open port is not available, an unused device can be unplugged to make a port available.

For convenience, users can add a USB hub to their system so that every device can be attached at the same time. Hubs are similar to AC outlet strips in that they use one outlet, but provide many more. Like outlet strips, several hubs can be connected together to accommodate many, many devices. In fact, USB can support up to 127 simultaneously connected devices for virtually unlimited expansion. USB hubs typically contain four or seven ports (not including the one used to connect it to the computer or another hub) and, depending on the model, use power from an AC adapter or from the computer through the USB cable.

In the future, users will be able to add USB ports to Macintosh computers by installing a USB card in a PCI or CardBus expansion slot. These cards will enable Macintosh owners to add USB to their system and enjoy all of the advantages of USB and the wide variety of new peripheral devices.



Technology Fact Sheet

Universal Serial Bus

Why USB?

Apple is committed to incorporating USB in future products for all of these reasons—and because of one more, very important advantage: the increased choice of peripherals that USB will provide to our customers. As a connectivity standard designed expressly to meet today's challenges and adapt to those of tomorrow, USB is the multiplatform standard for the personal computer industry. It effectively eliminates previous platform distinctions between peripherals, allowing customers to choose from a much wider range of devices with complete confidence that they are making a safe investment—by allowing them to share devices with users of the same and other platforms. It also enables organizations that support multiplatform computing environments to purchase peripherals solely on the basis of needed functionality, freeing them from the need to carve up budgets according to platform percentages.

For peripherals manufacturers, USB provides the same safety and freedom. Developers can meet the needs of every potential customer with the same hardware product regardless of platform. (All they have to do is provide the appropriate small driver application or ensure that one has been preinstalled on the system.) With these advantages, it's easy to understand why USB has already been endorsed by hundreds of vendors, including some of the biggest names in peripherals. By standardizing on USB, Apple is lowering the development and production costs for peripherals manufacturers. Coupling this cost advantage with the increased market competition that will result from the removal of platform barriers, Apple is delivering the very best user benefit: a much wider selection of increasingly powerful, lower-cost, and varied devices from which to choose.

Apple continues to innovate by introducing great new technologies in our products. When we find existing standards that exemplify Apple values—our belief that using a computer should be easy, productive, and fun—we eagerly adopt them. When no such standards exist, we create them. In the case of USB, Apple is adopting an industry standard that's true to the Apple spirit and that supports Apple's central goal: to deliver features, simplicity, and choice that enhance the value that Macintosh offers our customers.



USB products that are Macintosh compatible will display the Mac and USB logos.

For More Information

The following resources offer additional USB information:

- Apple's USB home page is located at www.apple.com/usb.
- A listing of compatible third-party USB devices can be found at www.apple.com/guide (search for the keyword "USB").
- For more details about the USB specification, visit www.usb.org.

Apple stands behind its products with world-class service and support. Offering quality parts, extended hardware service options, phone support, and support via the Internet, we provide you with support choices that meet your needs. For more information, visit www.apple.com/support.

Apple Computer, Inc.

1 Infinite Loop
Cupertino, CA 95014
(408) 996-1010
www.apple.com

Identifying Macintosh-compatible USB products

Since the introduction of USB on Macintosh, many new and exciting Macintosh-compatible USB products have been introduced, and many more are being announced every day. Customers can identify these products by looking for the Mac and USB logos on the packaging. When the logos appear together on the package, the product is compatible with Macintosh computers with USB. Apple maintains a list of Macintosh-compatible products, including USB products, on its web site. Visit the Macintosh Product Guide (available in several languages) at www.apple.com/guide, and search for the keyword "USB."

If the USB product doesn't display the Mac logo, it may still be compatible with Macintosh. Remember that Apple includes drivers for keyboards, mice (and other pointing devices), and USB hubs in every Macintosh with USB, and will be including built-in drivers for other popular products in the future. While drivers are often included with USB products on CD-ROM, many developers also provide Macintosh software drivers for their products on their web site. If in doubt about a particular product, visit the manufacturer's web site or call to inquire about Macintosh compatibility.