

Everything You Need to Know About USB 3.0

- What is USB 3.0?

USB 3.0 (aka SuperSpeed USB) is a major update to USB 2.0 that promises higher performance with better power management. It was first introduced on September 17, 2007 at the Intel Developer Forum.

- How fast is it?

Transfer rates can go up to 4.8 Gbits/s as opposed to USB 2.0's 480 Mbits/s. This means USB 3.0 can be up to 10 times faster than its predecessor! It is achieved through the SuperSpeed technology which allows multiple streams of data transfer.

Interface	Bandwidth
USB 2.0	480Mbits/s
USB 3.0	4.8Gbits/s
SATA-II	3Gbits/s
SATA-III	6Gbits/s

However, the fastest USB 2.0 drives are only able to reach about 50% of their theoretical bandwidth cap, topping out at around 250Mbits/s. The first USB 3.0 devices to reach the market will probably run at only 1.4Gbits/s, far beneath the 4.8Gbits envelope yet substantially faster than any USB 2.0 device. Second generation USB 3.0 devices can be expected to rival SATA-II performance with actual transfer speeds eclipsing 2Gbits/s.

- Who needs all that speed?

Video is one of the big drivers for higher speed. Handheld video cameras are pervasive. HD video uses massive amounts of storage, and transferring video through USB 2.0 takes a lot of patience. This isn't just for video professionals, but average consumers with digital video cameras.

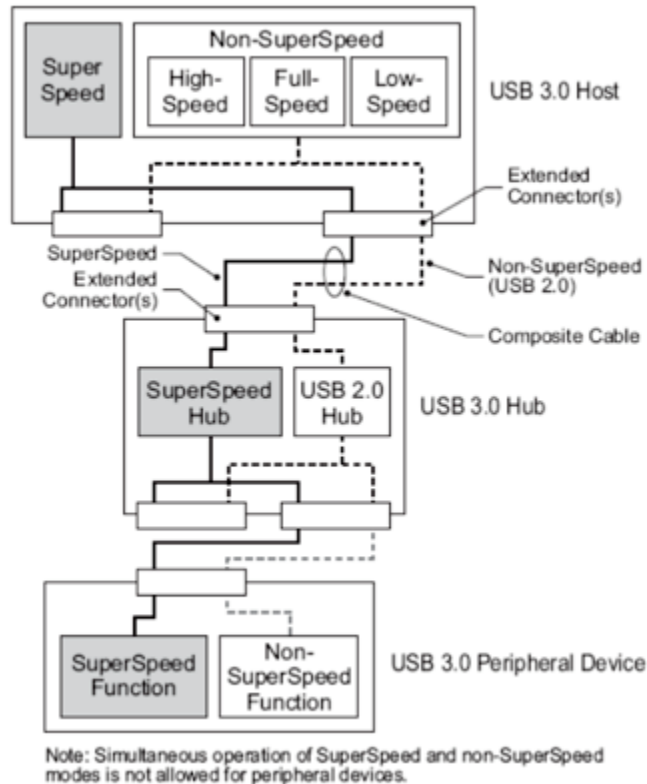
External removable storage also is in desperate need of a speed boost, both for transporting and backing up data. eSATA is fast, but doesn't have broad enough adoption in the market. USB 3.0 will replace eSATA and FireWire as the de facto high speed external interface.

The first USB 3.0 devices on the market will probably be USB flash drives, external hard drives and digital video cameras.

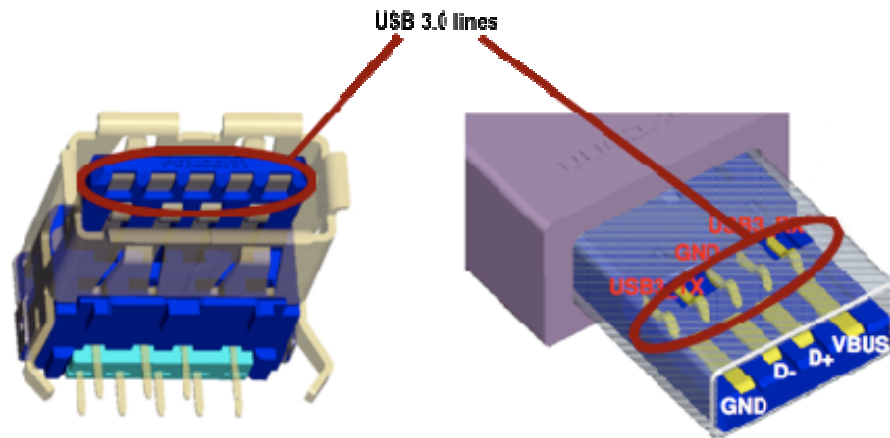
Interface	4MB Song / Photo	1GB	16GB	25GB HD Movie
USB 2.0	0.1 sec	33 sec	8.9 min	13.9 min
USB 3.0	.001 sec	3.3 sec	53 sec	70 sec

- How does USB 3.0 work?

USB 2.0 has 4 wires: two data lines, power and ground. USB 3.0 uses an additional 5 wires – two transmit lines, two receive lines and an additional ground – for a total 9. The extra wires constitute an additional bus that works in parallel with the HighSpeed USB 2.0 port.



This architecture enables the USB 2.0 port to be fully functional for USB 2.0 devices while supporting SuperSpeed transfer mode for USB 3.0 devices. It achieves full backward and forward compatibility. As you can see in the SuperSpeed Standard A connector image below, the additional 5 pins are recessed into the back of the USB 3.0 plug. And unlike USB 2.0, SuperSpeed USB can both send and receive data simultaneously. This is called dual simplex signaling.



One other important change is that USB 3.0 is asynchronous. Rather than broadcasting packets of data to every USB device, the controller will send packets 'asynchronously' point-to-point, directly to the right device by using information contained in the data packet's header. This eliminates the need for polling – devices having to constantly check if there is data to receive.

- What other new features are there?

▪ Higher bandwidth (up to 4.8 Gbps)
▪ Increased maximum power to the bus and increased device current draw to support USB devices that require more power
▪ Improved power management features to reduce active and idle power requirements
▪ Full-duplex data transfers and support for new transfer methods
▪ New backward compatible cables and connectors to support higher data transfer speeds.

- What about backward compatibility? Will it work with my USB 2.0 devices?

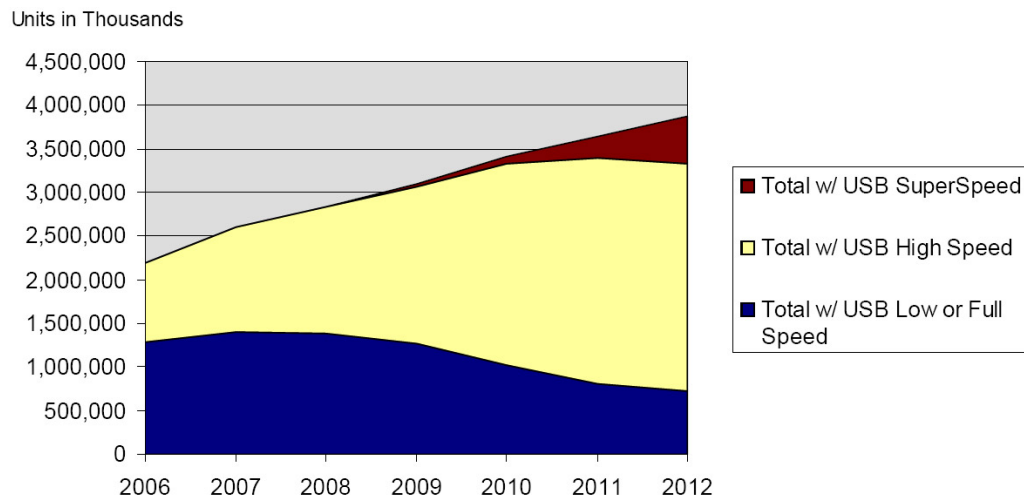
USB 2.0 and USB 1.1 devices are fully electrically and mechanically compatible with USB 3.0 ports and connectors. However, they will not achieve USB 3.0 speeds or take advantage of USB 3.0 features.

USB 3.0 devices are fully compatible with USB 2.0 and USB 1.1 ports and connectors, but won't run at SuperSpeed.

To gain the SuperSpeed advantage you must use USB 3.0 devices with USB 3.0 cables in a USB 3.0 port with USB 3.0 host controller.

- How long before USB 2.0 disappears?

With an installed base of over 10 Billion USB 2.0 devices, that standard is not going away overnight. USB 3.0 will initially cost more than USB 2.0 because it requires new and more complex controllers, cables and connectors, so USB 2.0 and 3.0 will co-exist for several years. Performance oriented storage and video devices will migrate to USB 3.0 early while low bandwidth devices like keyboards and mice will stay with USB 2.0. As USB 3.0 volume ramps up, the cost difference between the two will narrow. Here's one projection of the adoption rate. This forecast shows DDR2 continuing to grow through 2012. The skinny red sliver at the top is USB 3.0, but don't be fooled – the skinny red sliver grows to 500 million devices in 2012!



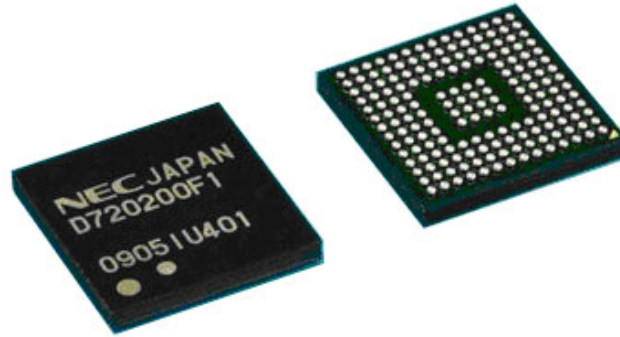
Source: In-Stat, 3/08

- Will I have to download drivers for USB 3.0?

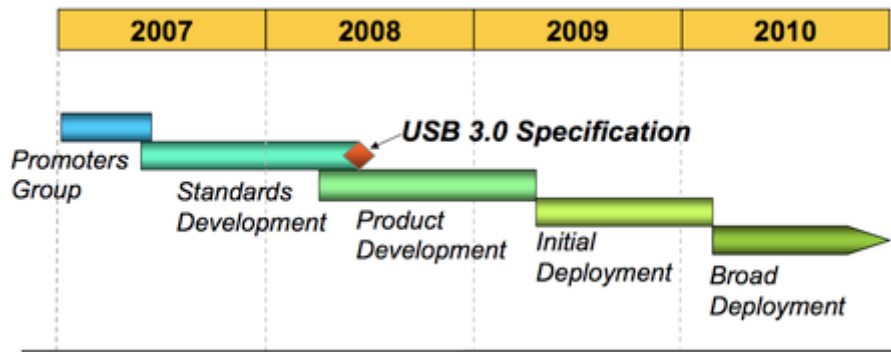
Windows 7 and Linux 2.6.31 plan to support USB 3.0 natively upon their releases. All other operating systems will most likely have drivers or updates in the future to support it.

- When will it come out?

NEC was the first to produce host controllers for USB 3.0 (announced on May 18, 2009). Expect to see motherboards with USB 3.0 ports and separate USB 3.0 controller cards as early as Q4 2009. Asus already announced USB 3.0 ports with their Asus P6X58 motherboard. However, production was cancelled due to lack of third-party drivers.



Early USB 3.0 devices will reach the marketing in Q4 2009. Expect mass adoption into high-bandwidth applications in 2010. This timeline indicates broad deployment starting early 2010, which is about when chipset makers Intel and Nvidia will start integrating USB 3.0 controllers into their chipsets.

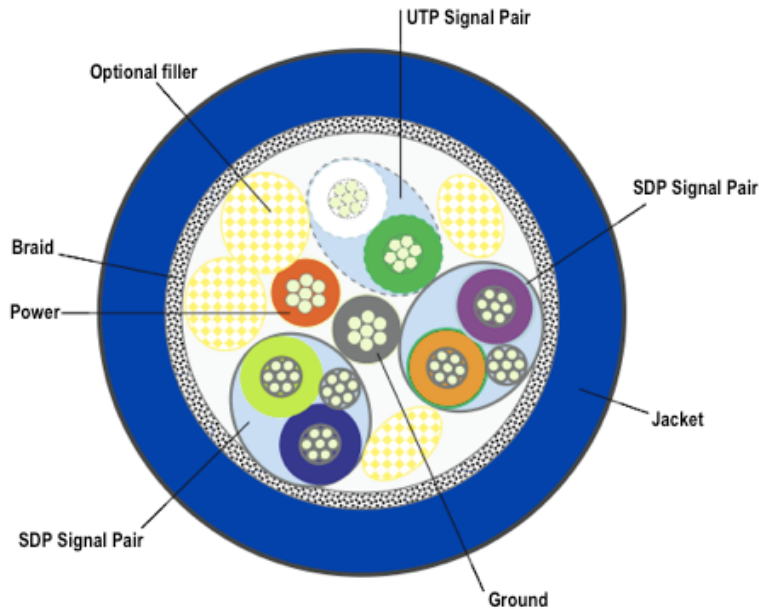


Active Media Products will be among the first to ship USB 3.0 flash drives in Q4 2009. Stay tuned for our product announcements in the near future.

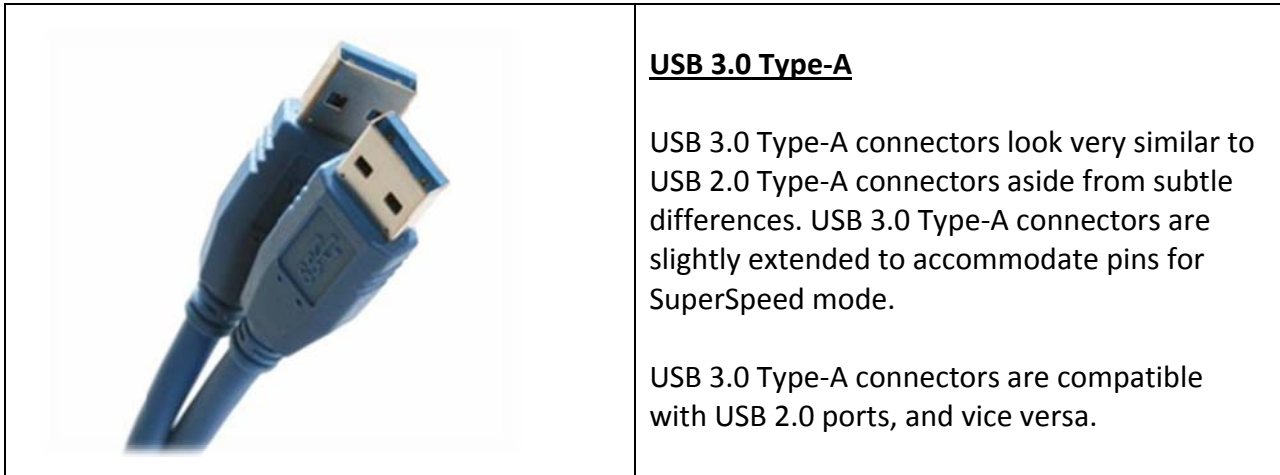


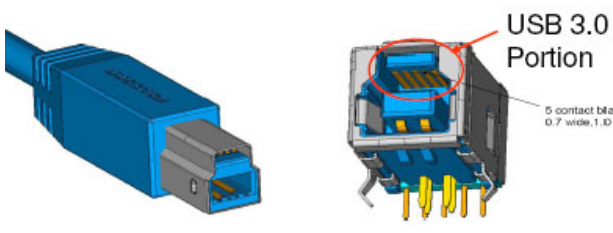

Everything You Need to Know About USB 3.0: Cables

USB 3.0 cables have two additional shielded differential pairs (SDP) of wires for a total of 9 signal wires. 3.0 cables have to be shielded to prevent electromagnetic interference and maximize signal integrity. This means the cables are thicker, heavier, less flexible and more expensive than 2.0 cables.



There are several different USB 3.0 connectors, which are similar to the 2.0 connectors.



 <p>USB 3.0 Portion</p> <p>5 contact blades 0.7 wide, 1.0 p</p>	<p><u>USB 3.0 Type-B</u></p> <p>USB 3.0 Type-B connectors are modified USB 2.0 Type-B connectors with SuperSpeed pins added on top.</p> <p>USB 2.0 Type-B cables are compatible with USB 3.0 ports, but not vice versa. Type-B connectors are commonly used on large stationary devices like printers.</p>
 <p>USB 3.0 Portion</p>	<p><u>USB 3.0 Micro-B</u></p> <p>The Micro-B connector is identical to the 2.0 connector but with an extended portion for the extra 5 pins.</p> <p>The USB 3.0 cable can not be plugged into a USB 2.0 port, but the 2.0 cable can be used in a 3.0 port.</p>

For More Information

- <http://www.usb.org> (USB Homepage)
- http://www.usb.org/developers/docs/usb_30_spec_052109.zip (Download - USB 3.0 Technical Specifications)
- http://en.wikipedia.org/wiki/Universal_Serial_Bus#USB_3.0 (Wikipedia – USB Article)
- <http://www.necel.com/usb/en/index.html> (NEC - World's First USB 3.0 Host Controller)
- <http://www.activemp.com> (Active Media Products – USB 3.0 Products TBA)