

August 24th, 2011 - Thunderbolt is a lightning fast new Input/Output (I/O) technology developed by Intel that combines data, video, audio, and power all in a single connection. It works at speeds up to 10 GBps, which is double the rate of the previous fastest technology, USB 3.0, which maxes out at 5 GBps.



Thunderbolt combines the display port and PCI Express data performance technology, allowing you to bi-directionally transfer data and use any display cables and accessories that previously existed for mini-display port. So, Thunderbolt equipped MacBooks are reverse compatible with Mini DisplayPort monitors and adapters. Best of all, Thunderbolt comes standard with every new MacBook Pro, and Apple's Thunderbolt cables are compatible with every current docking station offered by Henge Docks.



How Does Thunderbolt Work?

Inside of each Thunderbolt device, there are two pathways: PCI Express and DisplayPort. The thunderbolt cables carry signals for both simultaneously. Thunderbolt products require a controller chip supplied by Intel and a small connector that is included in platforms (such as the new MacBook Pros) supporting this technology. Cables and other compatible devices will be sold separately.

What are the Real-World Applications of Thunderbolt?

With all of these advancements, thinner and lighter laptops are now very expandable using thunderbolt cables and external devices for maximum portability. 15-inch and 17-inch MacBook Pros with Thunderbolt ports can run one or two high-resolution displays at once, and 13-inch MacBook Pros and MacBook Air models will be able to run a single external monitor. They can copy an entire DVD's worth of information in seconds, back up an entire terabyte in a few minutes, transfer a full-



length Blu-Ray movie in under 30 seconds, and back up an entire year's worth of MP3 playback in just over 10 minutes.

Also, a wide range of thunderbolt interface adapters to USB 3.0, 2.0, and 1.1 are expected, making it highly compatible and adaptable to unique, individual set-ups.

What about Apple's new 27-inch Thunderbolt Display?

There has been a lot of confusion surrounding Apples new 27-inch Thunderbolt Display. Henge Docks has been gathering information on the new displays prior to release and here is what we know so far.

The 27-inch Thunderbolt Display is not going to replace the 27-inch Cinema Display immediately. Because Mini DisplayPort equipped MacBooks are not compatible with Thunderbolt Displays, the Cinema Display will continue to serve legacy Mac users. Thunderbolt Displays feature a variety of ports, including a Thunderbolt I/O port, on the rear of the display. This allows 15-inch and 17-inch MacBook Pros to run multiple Thunderbolt Displays, but not Mini DisplayPort equipped displays such as the Apple 27-inch Cinema Display.



Which Computers Have Thunderbolt?



Any new MacBook Pro sold after February 2011 comes standard with a Thunderbolt port replacing the Mini DisplayPort (this port still supports Mini DisplayPort cables and peripherals). Since then, new MacBook Airs, and 21-inch and 27-inch iMacs have been released with Thunderbolt ports as well – the 27-inch with 2 Thunderbolt ports.

Apple is also expected to release Mac Pro Towers and Mac Minis that include Thunderbolt ports standard, as each of them are refreshed in 2011.

PC's are expected to be available with Thunderbolt in early 2012.

What else does Thunderbolt do?

Here are the key features listed by Intel, put into perspective by Henge Docks

- *Dual-channel 10 GBps per port* - Thunderbolt allows you to use its full bandwidth on two devices at once. According to MacWorld, it has an estimated real-world performance of 8 GBps.
- *Bi-directional* - Basically you can have two channels sending signals or moving data in either direction at the same time at super fast speeds.
- *Dual-protocol (PCI Express and DisplayPort)* - Thunderbolt combines both PCI Express and DisplayPort into one connection so it eliminates the need for multiple cables. You can run audio, video, and data all over the same cable.
- *Compatible with existing DisplayPort devices* - You can still plug in any Mini DisplayPort cable/ adapter/ device and it will work, including our Henge Docks brand adapters.
- *Daisy-chained devices* - Up to 7 devices (including the computer) can be daisy-chained and run through one thunderbolt port at the same time. This eliminates the need for any hubs that create excess clutter on your desk.
- *Electrical or optical cables* - Only copper cables and set-ups are currently being offered, but Intel plans to offer fiber-optic in the future.
- *Low latency with highly accurate time synchronization* - When they say highly accurate, they mean it – thunderbolt devices will stay in sync within 8 nanoseconds of each other, even across 7 devices, which is great for video and audio applications.
- *Uses native protocol software drivers* - Because thunderbolt uses common technology (DisplayPort and PCI Express), no extra software is required to use a thunderbolt-enabled device. You can just plug it in and go, simplifying your experience.
- *Power over cable for bus-powered devices* - Thunderbolt ports provide 10 watts of power to plugged in peripherals so you can work on the go. This won't be enough to power a full high-resolution display, but its enough to run small devices for short periods of time, which can be very useful for those who travel frequently or want to plug devices into shared Henge Docks for presentations, office meetings, and more.



What about current technology vs. future technology?

Thunderbolt cables are currently made with copper wiring. This is advantageous because it makes the cables cheaper to manufacture (and therefore purchase), and it is also what allows these cables to carry power. Copper wiring limits the maximum length that the cables can be made, though, to 3 meters and is sometimes error and inference-prone.

In the future, Intel plans to offer fiber optic Thunderbolt cables, which will be advantageous because they can have an unlimited cable length and promises to offer transfer speeds up to 100 GBps.

Conclusion

Thunderbolt makes even the smallest Macs very expandable with just one port that carries audio, video, data, and a small amount of power all at the same time. Thunderbolt is fully compatible with a Henge Docks set-up and helps provide an easy way to run dual monitors at high definition without needing a hub or other USB, and you can still plug in any Mini DisplayPort adapter so any of our current models are compatible, including those sold before February, 2011. Thunderbolt promises to be a fantastic new frontier for growth, portability, and adaptability for Apple users.

