



Technology Fact Sheet

Thunderbolt™ Technology: The Fastest Connection to Your PC Experience

June 2012 — At Computex in Taiwan, Intel® Corporation is providing industry updates about Thunderbolt™ technology's momentum, including new products, market trends and Thunderbolt's coming arrival on the Windows* platform.

About Thunderbolt Technology

Thunderbolt technology is a transformational high-speed, dual protocol I/O that provides unmatched performance over current I/O technologies with 10Gbps bi-directional transfer speeds. It provides flexibility and simplicity by supporting both data (PCI Express*) and video (DisplayPort*) on a single cable connection that can daisy-chain on the Mac. Thunderbolt™ technology will enable flexible and innovative system designs and is ideal for thin profile systems and devices such as Ultrabook™ systems.

Key Thunderbolt Technology Benefits

Thunderbolt technology dramatically increases the data transfer rate to enable faster backup, editing and file sharing, significantly reducing the time to complete key tasks. This enables audio and video creation, playback and editing that no other standard interconnect technology can match.

Key Features

- 10Gbps bi-directional, dual channel data transfer
- Data & Video on single cable with Dual-protocol (PCI Express* and DisplayPort*).
- Daisy chain on the Mac.
- Compatible with existing DisplayPort* devices.
- Uses native PCI Express* and DisplayPort* protocol software drivers.
- Power over cable for bus-powered devices (electrical cables only).

Industry Support

As of Computex 2012, there are over 60 innovative announced Thunderbolt-enabled products from companies including Lenovo*, Acer*, ASUS*, Gigabyte*, Intel, Apple* Inc., Universal Audio*, MOTU*, Blackmagic*, Aja*, Seagate*, Promise* Technology Inc., and LaCie*. Intel is working with the industry to enable a variety of Thunderbolt-enabled products, including computers, displays, high-speed data storage devices, audio/video devices and more.

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How Thunderbolt Technology Works

Intel Thunderbolt controller chips interconnect a PC and other devices, transmitting and receiving information for both PCI Express* and DisplayPort* protocols. The Thunderbolt controller chip switches between the two protocols to support communications over a single cable. Intel is making its controller chips available to the industry, and is working with other component manufacturers to deliver the Thunderbolt connectors and cables.

Controller Architecture

A Thunderbolt controller is the building block used to create Thunderbolt products. A Thunderbolt controller contains:

- A high-performance, Thunderbolt switch.
- One or more Thunderbolt ports.
- One or more DisplayPort* protocol adapter ports.
- A PCI Express* switch with one or more PCI Express* protocol adapter ports.

The external interfaces of a Thunderbolt controller that are connected in a system depend on the application for which the system is designed. Host-side Thunderbolt controllers have one or more DisplayPort* input interfaces, a PCI Express* interface along with one or more Thunderbolt technology interface. By integrating all the features necessary to implement Thunderbolt into a single chip, the host-side controller enables system vendors to easily incorporate Thunderbolt technology into their designs.

Thunderbolt technology leverages the native PCI Express* and DisplayPort* device drivers available on Mac OS X today, and is now arriving on the Windows platform. This native software support means no extra software development is required to use a Thunderbolt technology-enabled computer.

For more information, visit the Thunderbolt web site, www.thunderbolttechnology.net

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