

# Thunderbolt™ Technology

June 2011

Intel Corporation



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# Announcement – Feb 24, 2011

**Thunderbolt™ Technology:  
Fastest Data Connection to your PC has Arrived!**

**Blazingly fast data transfer combines  
with HD display connectivity on a single cable**

**Apple\* is first to market on their new line of  
MacBook Pro's**



**THUNDERBOLT™**

# Industry Trends & Opportunities

- Explosion of media

*Average household digital media storage will approach 1 TB by 2014*  
Source: 2010 Parks Associates

- Consumers want smaller, thinner devices



- Too many connectors, too complex

Thunderbolt technology was created  
to meet these challenges

# How We Got Here

- Conceived and developed in Intel Labs as a single cable with high-speed and multiple protocols
- Announced at Intel Developer Forum in Sept 2009 codenamed Light Peak
- Collaborated with Apple\* to bring to market the Thunderbolt electrical solution

# Thunderbolt Technology Overview

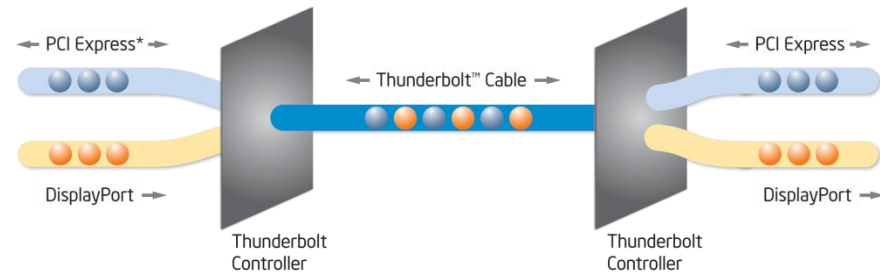
Transformational high-speed, dual-protocol, PC I/O delivering *performance*, *simplicity*, and *flexibility*

## Leading Performance in PC I/O

- Faster speed & multi-tasking
- Pro class A/V creation

## Simple & Flexible

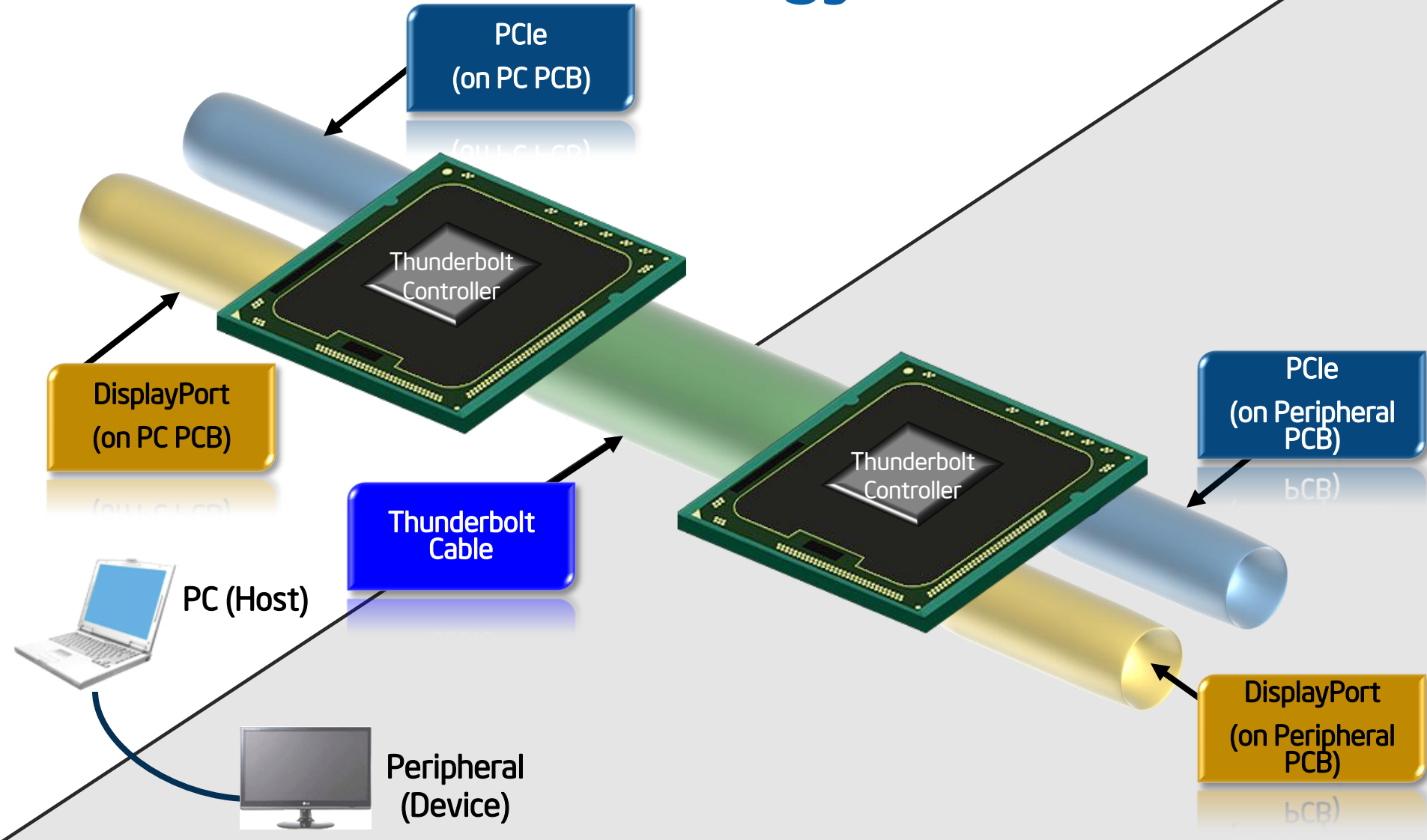
- Connect to more devices
- Add more devices simply



\* Based upon maximum theoretical bandwidth of comparable PC I/O technologies (e.g. USB, IEEE 1394 Firewire®, eSATA)

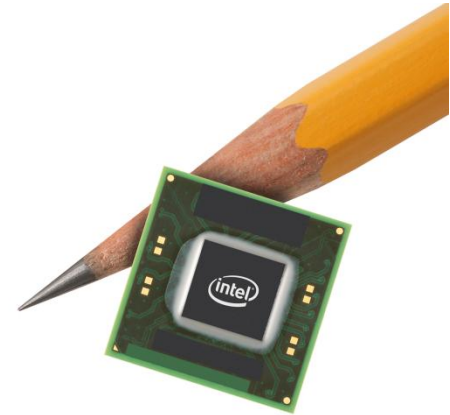


# Thunderbolt Technology - How it Works



# Thunderbolt Technology Architecture

- 10Gbps per channel, bidirectional
- PCIe and DisplayPort protocols
- Compatible with standard DisplayPort displays
- Daisy chain topologies
- Low latency, 8ns accuracy time sync across 7 devices
- Small connector with electrical and optical cables



Application-specific  
Protocol Stacks

PCIe

DisplayPort

Common Transport Layer

Electrical/Optical Layer

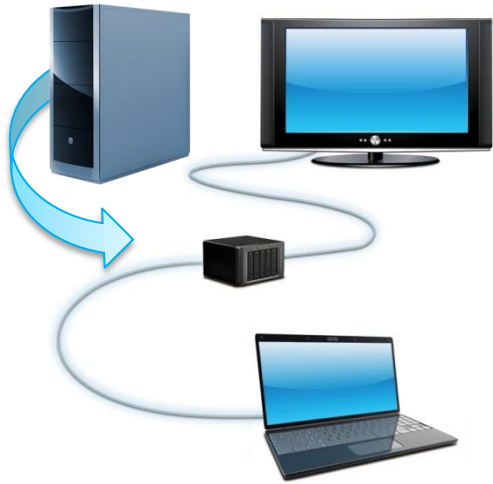
Connector and Cable

Thunderbolt™ Technology



# Thunderbolt Technology Makes New Things Possible...

## Flexible System Designs



- Workstation I/O in a laptop
- I/O expansion

## Faster Media Transfer & Sync n Go



- Move media files faster
- Fastest I/O for Intel® Quick Sync Video
- Faster, expandable backup and restore

## Media Connectivity & Creation



- Low latency
- High sync accuracy
- Dedicated bandwidth
- Better multi-tasking
- One cable for data and display devices

# Industry Participation



G-Technology  
by Hitachi



UNIVERSAL AUDIO

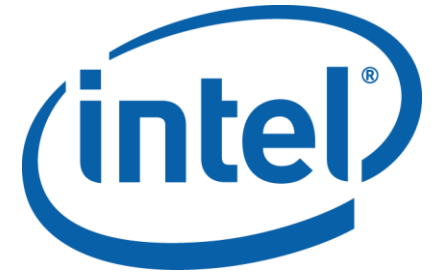


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# Summary

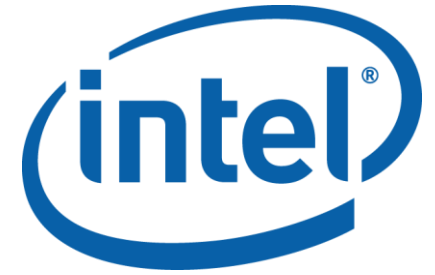
- Thunderbolt™ technology is a new high-speed, dual-protocol interconnect from Intel
- Thunderbolt technology delivers performance, simplicity, and flexibility
- Thunderbolt technology is available to the industry



# Thank you!

For more information, go to  
[www.intel.com/technology/io/thunderbolt/index.htm](http://www.intel.com/technology/io/thunderbolt/index.htm)





# Backup



# Device Maker Support Statements

*"Welcome to the future, Thunderbolt™ technology enables the fastest and simplest I/O for connecting AJA's award-winning professional video capture and playback products to your laptop."*

**- John Abt, CEO, AJA**

*"Thunderbolt™ technology is connectivity without compromise and will enable the full promise of Symphony I/O, Apogee's professional digital audio recording platform."*

**- Betty Bennett, CEO, Apogee**

*"We are very excited by the capabilities of Thunderbolt™ technology. To have two 10Gbps, bi-directional, multi-protocol channels in a single cable is a great step forward for high performance audio and video solutions."*

**- Max Gutnik, Sr. Director, Product Management, Avid Technology**

*"Thunderbolt™ technology will revolutionize mobile media creation. It's a game-changer and will accelerate our ability to build the highest quality video creation products that are affordable to everyone."*

**- Grant Petty, CEO, Blackmagic**

*"Thunderbolt™ technology is a breakthrough in I/O technology and represents the future of mobile computing. Soon you will be able to carry all the power and functionality of desktop environments in compact devices."*

**- Philippe Spruch, Chairman and General Manager, LaCie**

*"Pegasus family storage products will be blazingly fast with Thunderbolt™ technology, consumers and creative professionals alike will experience a remarkable leap in performance."*

**- James Lee, CEO, Promise Technology**

*"Technology like this only happens about once a decade. We are thrilled about the performance and simplicity Thunderbolt™ technology will bring to our award-winning UAD Powered Plug-Ins platform."*

**- Bill Putnam, CEO, Universal Audio**

*"Western Digital believes Thunderbolt™ technology will bring both new performance levels and simpler connectivity for consumers to access and enjoy their digital media in new and innovative ways."*

**- Dale Pistilli, VP Marketing, Branded Products, Western Digital Corporation**

