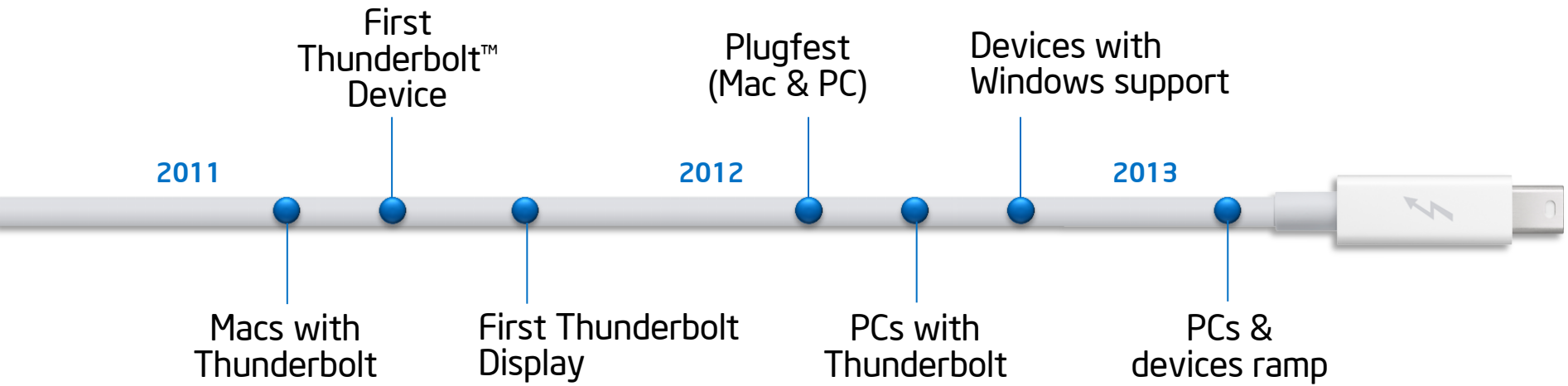
Thunderbolt™ Technology Update

Jason Ziller – Marketing Director,
Client Connectivity Division
Intel Corporation

April 8, 2013

Looking Back…



Macs with Thunderbolt™ – Many with Two Ports

MacBook Pro w/ Retina Display 13" & 15"
(Two Thunderbolt Ports)

MacBook Air 11" & 13"

iMac 21.5" & 27"
(Two Thunderbolt Ports)

MacBook Pro 13" & 15"

Mac Mini

MILLIONS OF MACS SHIPPED WITH THUNDERBOLT PORTS

THUNDERBOLT™

intel

PCs with Thunderbolt™ – More Coming 2013

PCs


Acer Aspire


Asus ET2300I


Asus G55VW


Asus G75VX


NEC Lavie L


Lenovo ThinkPad S430


NEC ValueStar W


Lenovo ThinkPad T430


HP Spectre XT Touch


Asus G46VW

Motherboards


ASRock
Z77 Extreme


ASUS
P8Z77 V-Pro


ASUS
Maximus V Ext


ASUS
P8Z77-V Pre


Intel
DZ77RE-75K


Gigabyte
GA-Z77MX-D3H


Gigabyte
GA-Z77X-UP4


Gigabyte
GA-Z77X-UP5


MSI
MS-Z77A-G45


Intel
NUC – DC3217BY


MSI
Z77A-GD80

Broad Industry Support

MORE THAN 200 LICENSEES WORLDWIDE

Sampling of Thunderbolt™ Devices


WD MyBook Thunderbolt™ Duo


Seagate Go-Flex Desk Thunderbolt™


Blackmagic UltraStudio Express


LaCie Little Big Disk Thunderbolt™


LaCie 2Big Thunderbolt™


Promise J2


Avid HD Native


Blackmagic UltraStudio 4K


AJA ioXT


Blackmagic UltraStudio 3D


AJA KiPro Quad 4K


Blackmagic Cinema Camera

$299 or less


LaCie Rugged


Seagate Go-Flex Mobile Thunderbolt™


Elgato Thunderbolt™ SSD


Buffalo MiniStation Thunderbolt™


Akitio Neutrino Thunderbolt™


Freecom Mobile Drive Mg


Blackmagic UltraStudio Mini Recorder


Blackmagic UltraStudio Mini Monitor


AJA T-Tap


Blackmagic UltraStudio Extreme


Blackmagic Intensity Shuttle


Matrox MX02 Thunderbolt™ Adapter


Matrox Dock


Delock PA1215


Ethernet Adapter


Firewire Adapter


LaCie eSATA Hub

MORE THAN 75 CERTIFIED DEVICES; PRICES TRENDING DOWN

THUNDERBOLT™

intel

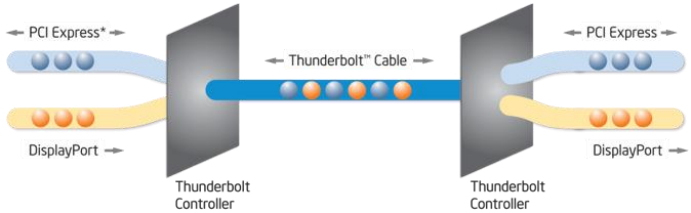
Thunderbolt™ Cables

- Manufacturers offering various lengths/colors
  - .1m to 3m for electrical cables; thinner cables coming soon
  - 10m to 100m for optical cables (30m now; 100m in Q2'13)
- Retail cables available; various brands, many distribution outlets
- Lower-priced cables available now

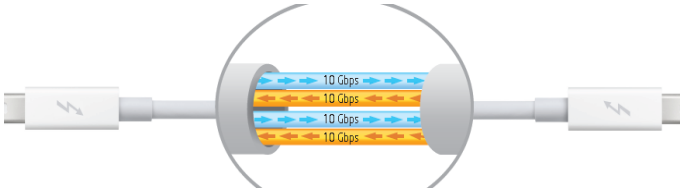
Key Features

- 10Gbs bi-directional per channel, dual-channel
- PCIe and DisplayPort protocols through a single compact port
- Compatible with standard DisplayPort displays
- Simple daisy-chaining of up to six devices allows one cable from the PC
- Active cables enable up to 3m electrical and 100m optical cable length
- 10W power delivery to bus-powered devices

How it works



Thunderbolt™ Cables



Thunderbolt™ Technology
Makes New Things Possible

Faster Sync 'N Go and Media Transfer

- Transfer an HD* movie in under 30 seconds
- Back up all your movies, TV shows, music, and photos at blazingly fast speeds

Unleash Your Creativity Faster Than Ever

- Capture and edit multiple uncompressed video streams in real time
- Daisy chain data and display devices to simplify your workflow
- Low latency audio creation

High Resolution and Responsive Docking

- Large, high-res displays so real, photos and video feel like you're there
- Fastest external storage, USB, and wired Ethernet
- More possibilities for laptop and all-in-one expansion

THUNDERBOLT™

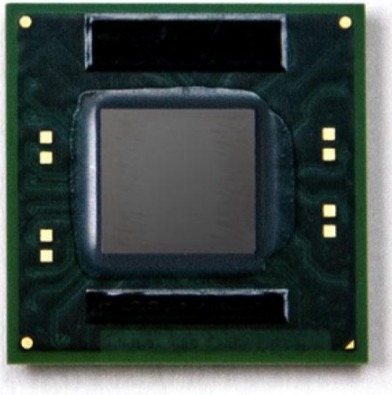
*High-speed storage required to achieve full transfer speeds; typical full length 1080p HD movie file size of 10-20GB. Results dependent upon system configuration.

intel

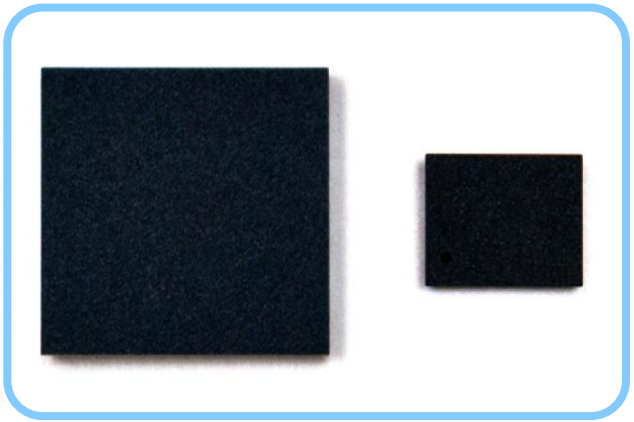
Intel's Newest Thunderbolt™ Host Controller

- Introducing Intel® DSL4510/4410 (codename Redwood Ridge)
  - DSL4510 = 4 channels/2 ports
  - DSL4410 = 2 channels/1 port
- Improvements over DSL3510/3310 (codename Cactus Ridge):
  - DisplayPort 1.2 capability when connecting to native DP displays
  - Improved power management
  - Reduction in platform BOM cost and area
- Targeted for upcoming systems with 4th generation Intel® Core™ processors

Thunderbolt™ Controllers



82524EF
"Light Ridge"
(1st Gen Host/Device)



DSL3510/3310
"Cactus Ridge"
(2nd Gen Host/Device)

DSL4510/4410
"Redwood Ridge"
(3rd Gen Host)

DSL2210
"Port Ridge"
(Single-Port Device Only)

Next-Generation Thunderbolt™ Controller

Codename Falcon Ridge

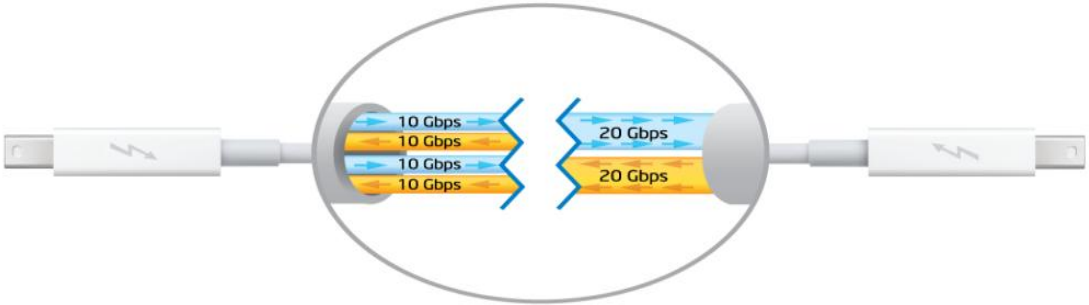
Runs at 20Gbs –

The Fastest* Connection to Your PC is Getting Faster!

Supports 4K video file transfer and display simultaneously

Fully backward compatible, same cables and connectors

Initial production expected before end 2013, ramp in 2014

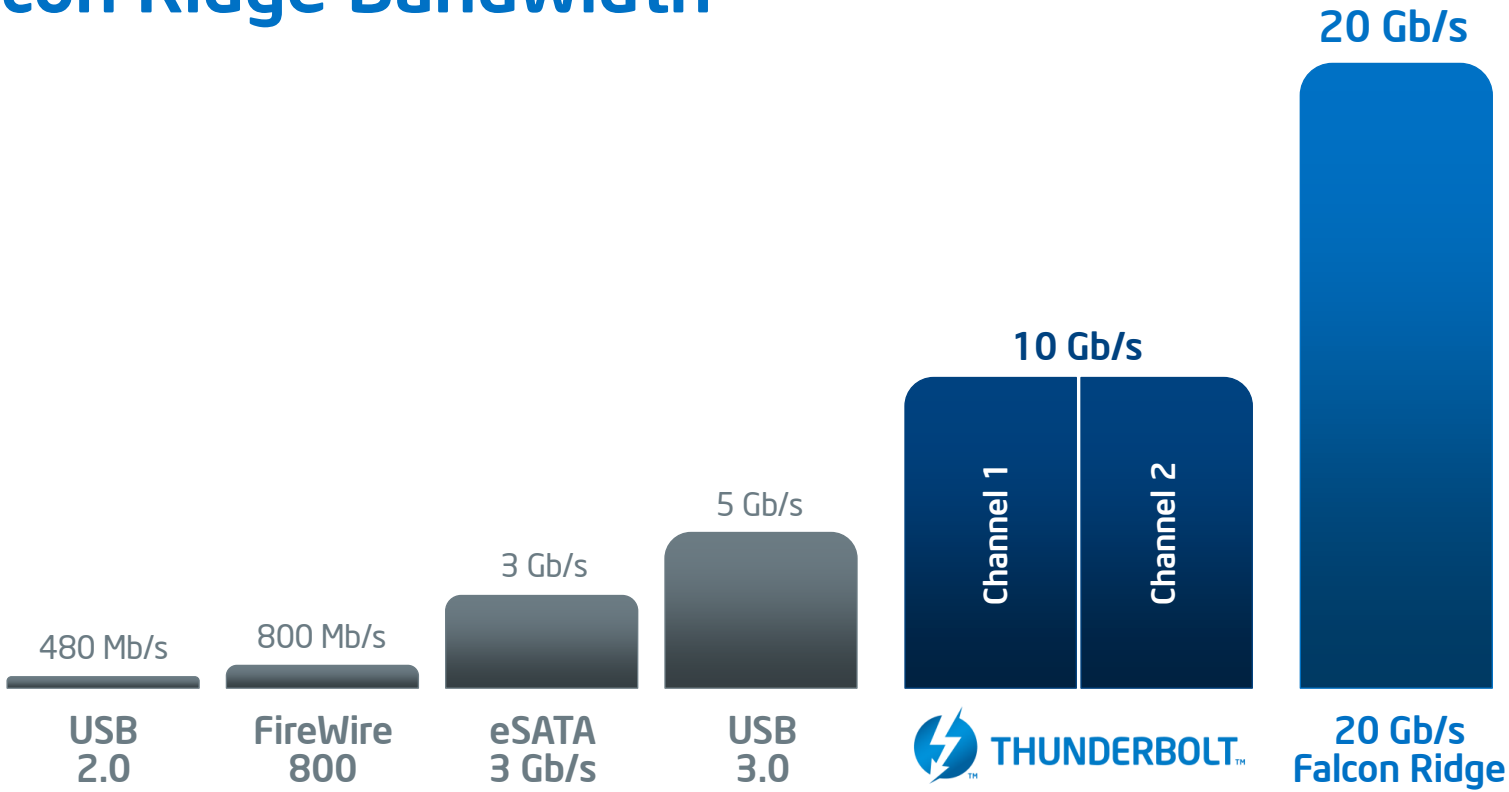


THUNDERBOLT™

*As compared to other PC I/O connection technologies including eSATA, USB, and IEEE 1394 Firewire**.
Performance will vary depending on the specific hardware and software used.

intel

Falcon Ridge Bandwidth



Unleash Your Creativity Faster Than Ever

Cinema quality 4K and workflow versatility

Fast storage and high-resolution displays with a single connector to PC

Cinema-quality 4K data transfers (~11Gbps) and/or 4K displays

Demonstration:

THUNDERBOLT™

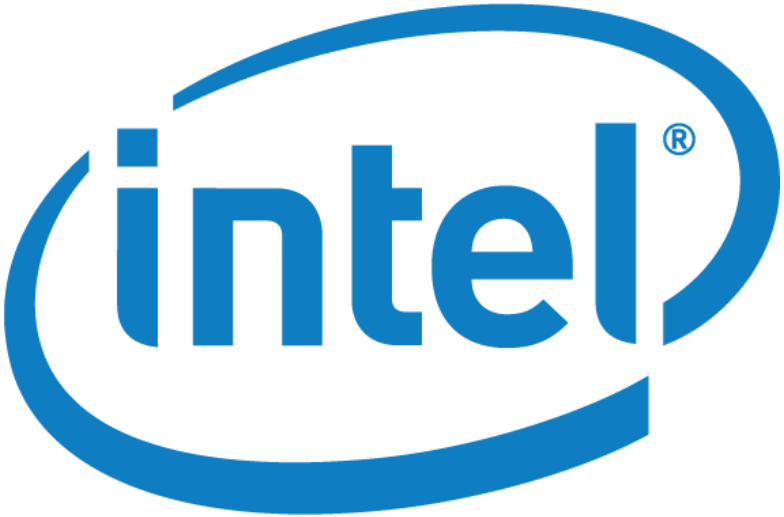
Guest Speakers:

Summary

- Thunderbolt™ continues to drive innovative usages on Macs, PCs, and devices from leading vendors
- Long optical cables now available; thinner electrical cables coming soon
- Intel's newest Thunderbolt controller DSL4510/4410 now available, targeted for upcoming systems with 4th generation Intel® Core™ processors
- Next-generation Thunderbolt controller was demonstrated – running at 20Gbs, enabling 4K video file transfer and display simultaneously
  - Initial production expected before end 2013, ramp in 2014

THANK YOU

For more information, go to
https://thunderbolttechnology.net/


intel

Legal Disclaimer

Notice: This document contains information on products in the design phase of development. The information here is subject to change without notice. Do not finalize a design with this information. Contact your local Intel sales office or your distributor to obtain the latest specification before placing your product order.

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS OTHERWISE AGREED IN WRITING BY INTEL, THE INTEL PRODUCTS ARE NOT DESIGNED NOR INTENDED FOR ANY APPLICATION IN WHICH THE FAILURE OF THE INTEL PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH MAY OCCUR.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

The code names, Light Peak, Sandy Bridge, Ivy Bridge, and others presented in this document are only for use by Intel to identify a product, technology, or service in development, that has not been made commercially available to the public (i.e., announced, launched or shipped). They are not a "commercial" name for products or services and are not intended to function as a trademark. Customers, licensees and other third parties are not authorized by Intel to use code names in advertising, promotion or marketing of any product or services and any such use of Intel's internal code names is at the sole risk of the user.

This material is intended as product positioning, not final end-user messaging

Performance comparisons are based upon maximum theoretical technology performance.

Intel, Intel Inside, Thunderbolt and the Intel logo are trademarks of Intel Corporation in the United States and other countries.

*Other names and brands may be claimed as the property of others.