Thunderbolt™ Update

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Thunderbolt™ Computer Update

100 million

Computers with Thunderbolt by the end of 2015

Major computer OEMs shipping Thunderbolt
Available Computers

Macs

PCs
Thunderbolt™ Device Update

250+

Certified Thunderbolt peripheral devices

Major device OEMs shipping Thunderbolt
Innovative Devices

Display docks

4K 60Hz docks

Highest speed and capacity portable storage

Multi-card reader hubs without bottlenecks
Computer Port Simplifications

1998 – USB consolidates and simplifies data ports

2011 – Thunderbolt 10Gbps interface for data + display devices

2014 – USB-C connector
  - Small
  - Reversible
  - Fast
  - 100W charging
  - Alternate Modes

2015 – What’s Next?
Thunderbolt™ 3

Codename Alpine Ridge
Thunderbolt™ 3 brings Thunderbolt to USB-C

More Speed

40 Gbps fastest connection

More Pixels

Dual 4K displays 60Hz

More Power

100W charging
15W device

More Protocols

The USB-C that does it all.
More Protocols

More protocols than any other I/O controller

Connect any dock, device or display, including billions of USB devices
Alpine Ridge integrates a USB3.1 (10Gbps) host controller – among the industry’s first to market
More Speed

- **40Gbps** Thunderbolt
  - PCI Express Gen 3 and DisplayPort

- **Double** the speed of previous generation

- **Four times** the data and **twice** the video bandwidth of any other cable
More Pixels

Large displays with amazing detail

- Twice the video bandwidth of any other cable
- Single-cable connection for two 4K 60Hz or a 5K 60Hz display
- 2 streams (eight lanes) of DisplayPort 1.2
More **Power**

**Optional - Notebook Charging up to 100W**
According to USB PD specification

**Standard - 15W to bus-powered devices**
- Higher speed and capacity storage
- Portable displays
- High-performance adapters
Device Configurations

Second device port operates the same as computer port and supports Thunderbolt, USB, and DisplayPort devices.

Daisy-chain up to six devices with Thunderbolt.
More Possibilities

4K Video

External graphics

Single-cable docking with charging

Thunderbolt™ networking
4K Video

Moving from HD to 4K creates **substantially more** data than the transition from SD to HD

Two 4K displays has nearly **16 million more** pixels than one HD display

View and edit photos and video on a **notebook** while **simultaneously** connected to 4K 60Hz display and external storage from a single port

4K TV’s and displays for **under $999**
Unrivaled **single-cable** docking

**Effortlessly** connect to everything you need

- Only way to get 4K 60Hz video + data from one USB-C
- Connect two 4K 60Hz displays with a single cable from computer
- Quick notebook charging
Enough **speed** to dock to **everything**

Showing max bandwidth for each protocol listed - many other protocols are possible depending on dock configuration (eSATA, card slots, Firewire, HDMI, Wi-Gig)
Thunderbolt™ **external** graphics

**Thin laptop** meet **hardcore gamer**

- Longer battery life when mobile – play games at higher quality settings at desk
- Graphics in dock or card chassis
- Supports hot plug/surprise removal
Thunderbolt™ Networking

10Gb Ethernet for Free

- Peer-to-peer
- Bridging multiple computers
- Uses existing OS infrastructure

- Small workgroups, shared storage
- PC migration
More **Cable** options

- **Passive 20Gbps** copper cables (lower cost)
  - Supports 20Gbps Thunderbolt, USB 3.1, and DisplayPort 1.2
  - Any length up to 2.0m

- **Active 40Gbps** copper cables
  - Supports 40Gbps Thunderbolt, and USB 3.1
  - Any length up to 2.0m

- **Active 40Gbps** optical cables
  - Under development for Thunderbolt 3 (targeting lengths up to 60m)
  - Targeted for 2016
Thunderbolt™ Compatibility

Features:
- Thunderbolt 3 host to Thunderbolt device
- Thunderbolt host to Thunderbolt 3 device

Thunderbolt 3 to Thunderbolt adapter
### Branding

<table>
<thead>
<tr>
<th>Name</th>
<th>Logo</th>
<th>Icon</th>
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<tbody>
<tr>
<td>Thunderbolt™ 3</td>
<td>![Thunderbolt Logo]</td>
<td>![Thunderbolt Icon]</td>
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<tr>
<td>Next Generation</td>
<td>Same as previous generation</td>
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Look for Thunderbolt icon on **certified** products and cables.
Summary

- Thunderbolt™ 3 = 40Gbps Thunderbolt, USB 3.1, DP 1.2 on USB-C
- For the first time, one computer port connects to Thunderbolt devices, every display, and billions of USB devices
- Provides four times the data and twice the video bandwidth of any other cable, while also supplying power
- It’s unrivaled for new uses, such as 4K video, single-cable docking with charging, external graphics, and built-in 10GbE networking
- Initial products with Thunderbolt 3 are expected to start shipping before the end of this year, and ramp in 2016
Q&A

Go to www.thunderbolttechnology.net for more information
Thank You!