

# Thunderbolt™ Update

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**THUNDERBOLT™**

# Thunderbolt™ Computer Update

# 100 million

Computers with Thunderbolt by the end of 2015



Major computer OEMs shipping Thunderbolt

# Available Computers



Macs

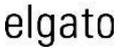


PCs

# 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



The USB-C that does it all.



More  
**Speed**



**40 Gbps**  
fastest connection

More  
**Pixels**



**Dual 4K displays**  
60Hz

More  
**Power**



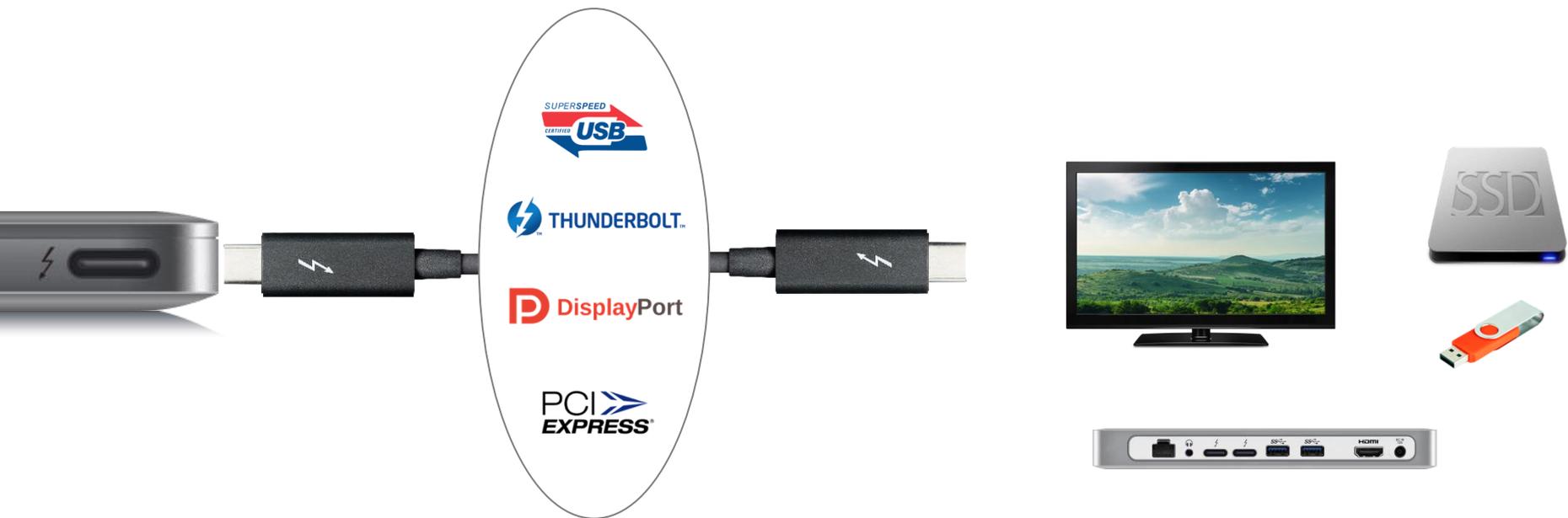
**100W**  
charging

**15W**  
device

More  
**Protocols**



# More Protocols



**More protocols** than any other I/O controller

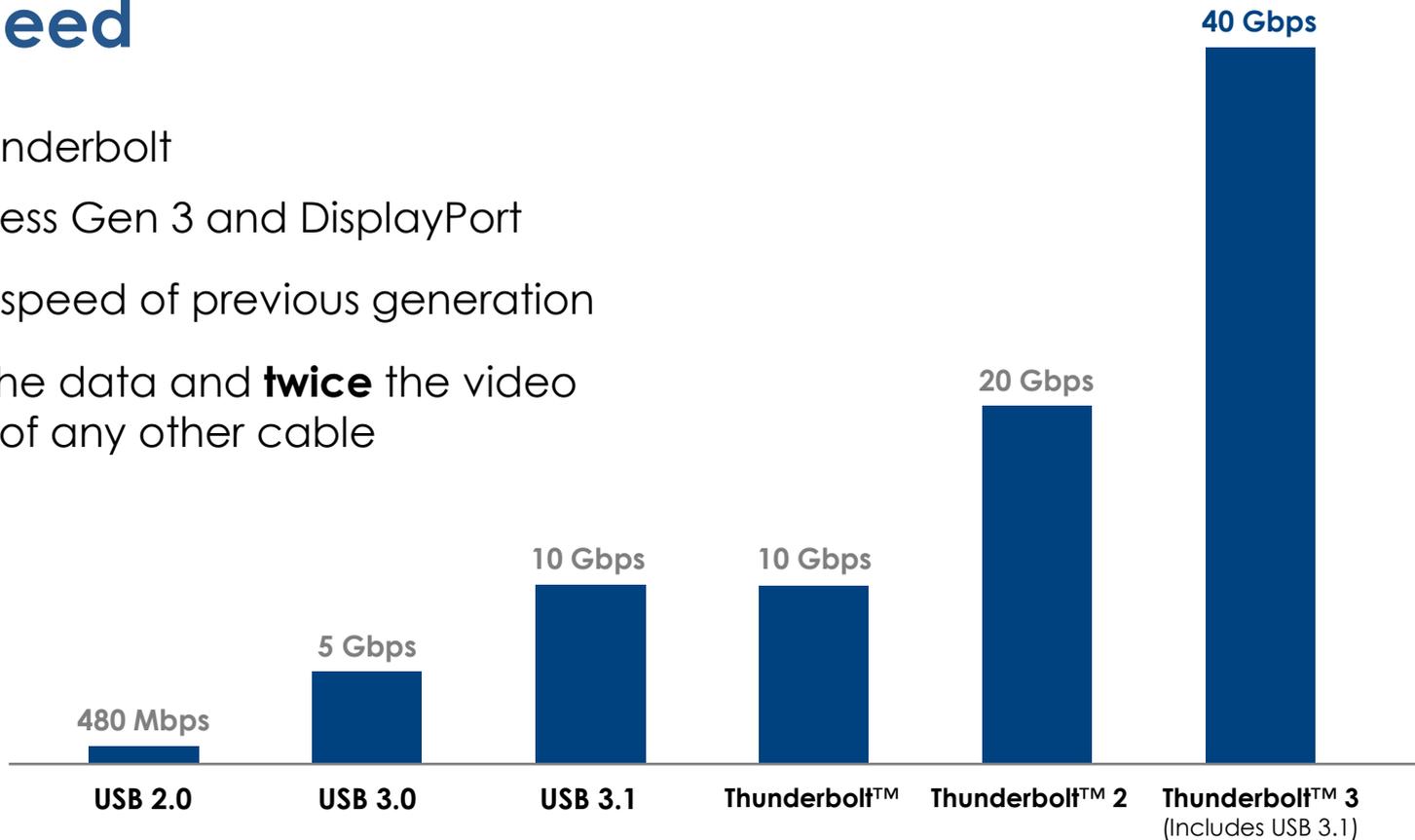
Connect **any** dock, device or display, including billions of USB devices



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



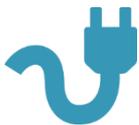
## Large displays with **amazing** detail

- 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

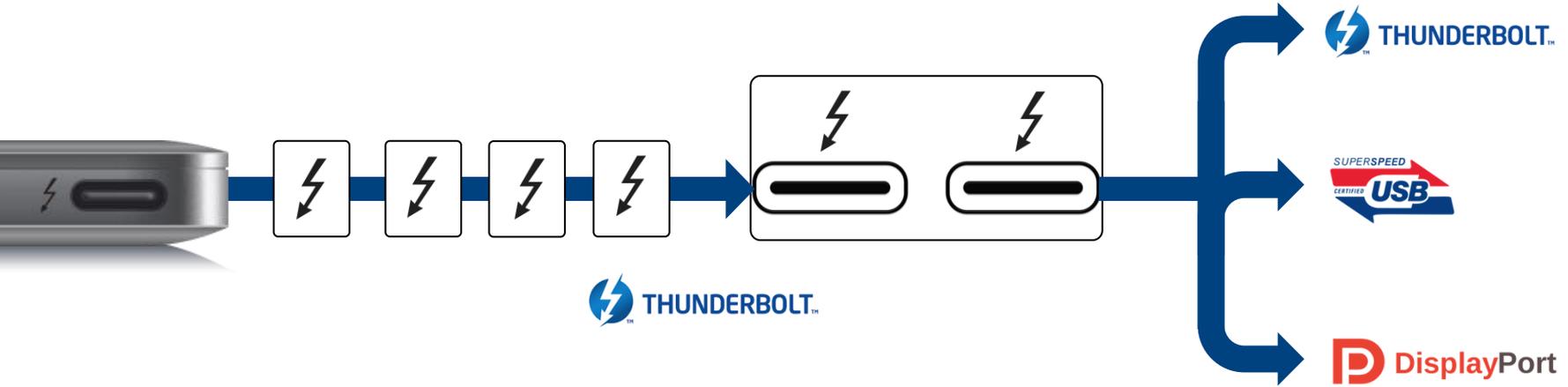
According to USB PD specification



## 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



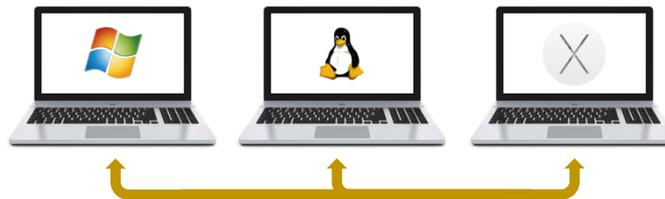
4K Video



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

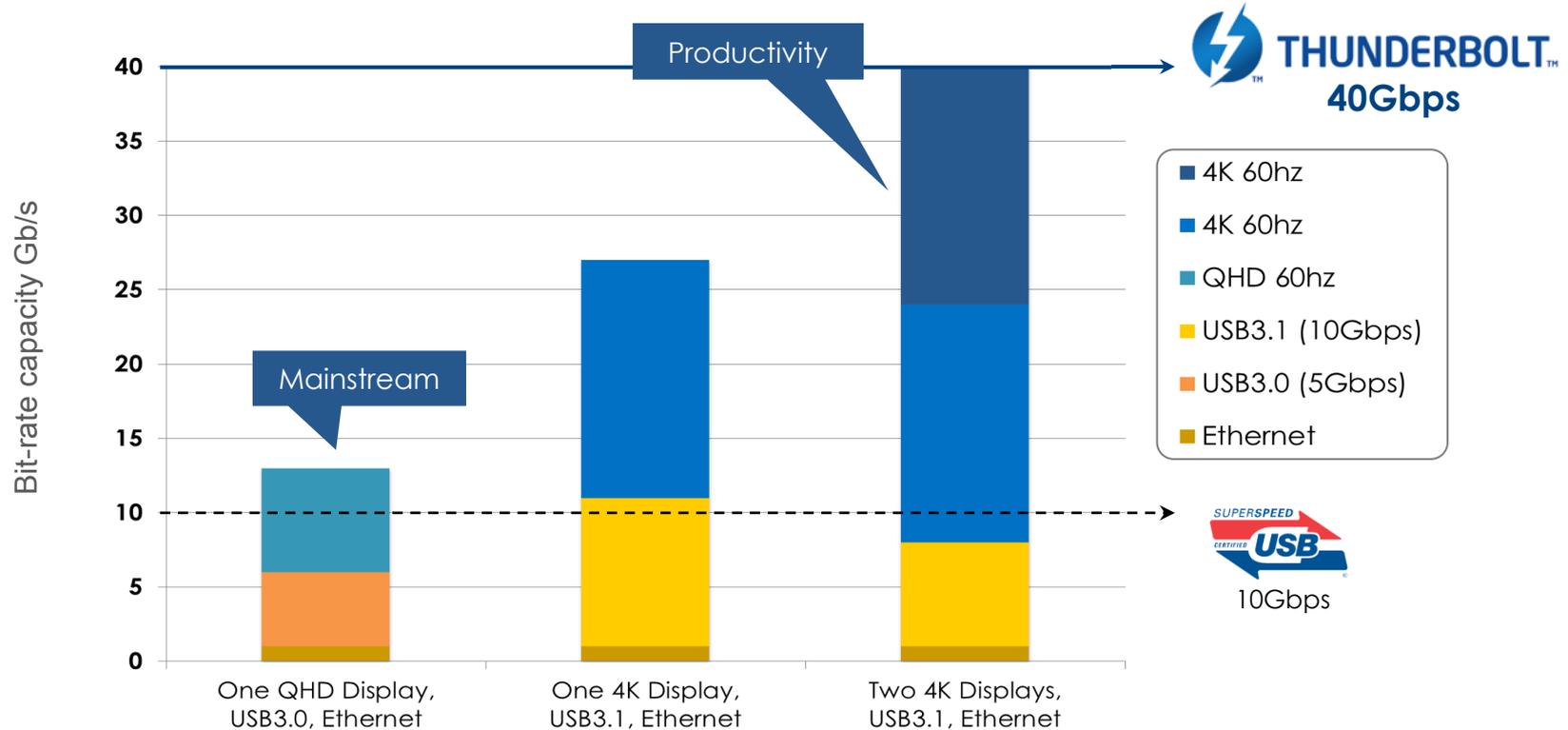
Two 4K displays has nearly **16 million more** pixels than one HD display

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**

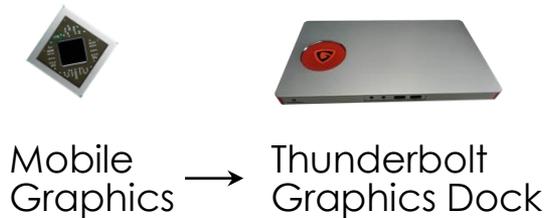
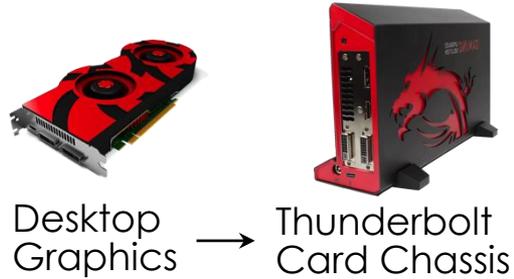


# Enough **speed** to dock to **everything**



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



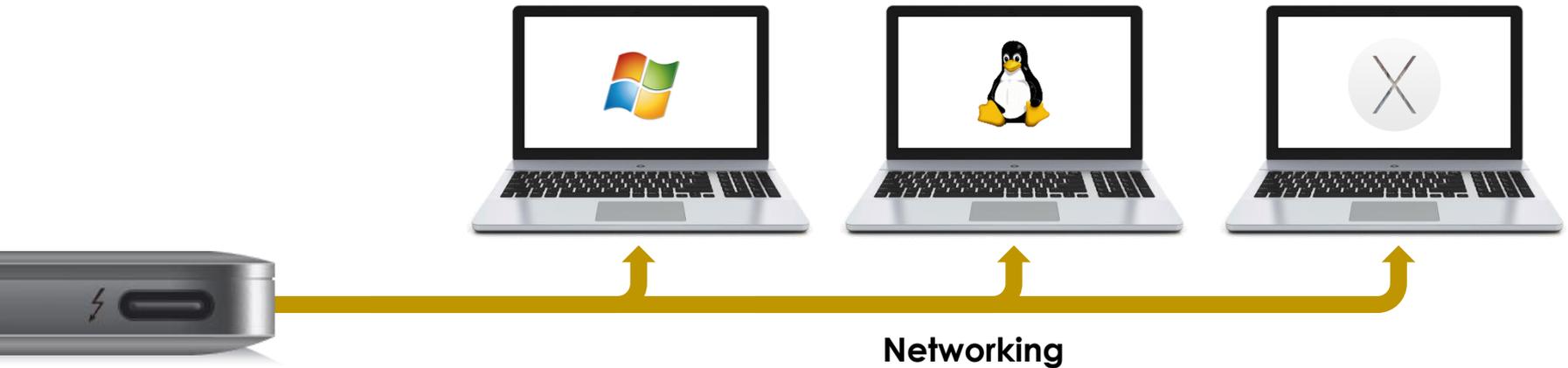
## Thin laptop meet hardcore gamer

- 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

Name	Logo	Icon
<b>Thunderbolt™ 3</b>		
Next Generation	Same as previous generation	

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](http://www.thunderbolttechnology.net) for more information

Thank You!

