

ABOUT ATTO TECHNOLOGY, INC.

For 30 years, ATTO Technology, Inc. has been a global leader across the IT and media & entertainment markets, specializing in storage and network connectivity and infrastructure solutions for the most data-intensive computing environments. ATTO works with partners to deliver end-to-end solutions to better store, manage and deliver data. Working as an extension of customer's design teams, ATTO manufactures host and RAID adapters, network adapters, storage controllers, Thunderbolt™ adapters, and software. ATTO solutions provide a high level of connectivity to all storage interfaces, including Fibre Channel, SAS/SATA, iSCSI, Ethernet, NVMe, NVMe over Fabrics and Thunderbolt. ATTO is the Power Behind the Storage.

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Thunderbolt™ 3 and USB-C Connectors:

GET THE MOST OUT OF NEW THUNDERBOLT PLATFORMS

Thunderbolt™ is a key element of most content creation and mobile workflows, enabling groups of people working on a project to share their efforts and collaborate in real time. Smaller form factors make Thunderbolt adapters a great component of mobile workstations and new Thunderbolt 3 platforms have even more throughput capabilities to support 4K workflows.

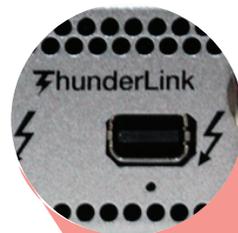
From a market standpoint, there is an upward trend in the adoption rates for mobile workstations. They have all the brains, power and technical abilities of a traditional tower workstation but all the beauty, flexibility and portability of a laptop. Mobile workstations also can now handle video and data demands that are more bandwidth intensive all from a single Thunderbolt port.

Thunderbolt technology was developed by Intel® with support from Apple®. It was designed to eliminate the need for a variety of cables, ports and slots because users can transmit PCIe data as

well as have connectivity for DisplayPort video, all from a single port.

While Thunderbolt is a more recent transfer technology, it has gone through some rapid and dramatic changes in its short lifespan. The original version of Thunderbolt provided a 10Gb/s transfer rates. This has now doubled in each successive generation, with Thunderbolt 3 boasting increased performance rates to 40Gb/s. While Thunderbolt 2 devices are currently widely available and supported, Thunderbolt 3 was announced in 2015 and the latest platforms and devices have begun to ship.

USB-C or Type C, on the other hand, is a connector style. It is differently shaped than previous USB A connectors, the traditional shape with which most consumers are familiar. USB-C connectors are reversible, meaning cables are correctly aligned on the first time, similar to what you see with the Lightning® charging cord for an iPhone®.



Thunderbolt 2
(Mini DisplayPort Connector)



Thunderbolt 3
(USB-C Connector)



Thunderbolt™ 3 and USB-C Connectors: A Primer

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The USB-C connector spec was finished in 2014 and 2016 saw rapid adoption on a widespread range of devices from laptops to workbooks, a trend that will continue in 2017 and beyond.

Since USB-C is simply the connector portion it still needs to support a transfer standard. A common myth or misperception is that USB-C has a transfer speed associated with it. USB 3.1, also known as USB 3.1 Gen 2, is going to provide widespread connectivity at 10Gb/s, is typically the standard support utilized over a USB-C connector.

There are a variety of different options for support when device manufacturers are designing their host products with USB-C connectors. Thunderbolt enabled hosts are designated with its lightning bolt-shaped logo next to the USB-C connector. While all Thunderbolt™ 3 platforms and products are utilizing USB-C, not all USB-C is utilizing Thunderbolt 3.

While USB-C connectors can support both Thunderbolt 3 and USB connectivity, it is important to know when users need a host that will support the Thunderbolt protocol as opposed to traditional connectivity such as USB 3.1.

USB allows for widespread connectivity. This gives users connectivity to countless USB devices and creates solutions where transfers are limited to 10Gb/s.

Thunderbolt 3, on the other hand, is specifically designed for high-performance connectivity. It extends speeds to 40Gb/s or 2750MB/s. It supports PCIe Gen 3 and DisplayPort 1.2 and has enough bandwidth to support 4K and 5K displays. Thunderbolt also gives users the power to extend a

device's reach with the ability to daisy chain six devices together. The latest generation of USB is now matched with where the first generation of Thunderbolt began. Thunderbolt currently delivers transfer speeds more than four times greater than USB's maximum threshold.

One of the largest areas of growth for Thunderbolt 3 has been in the PC market, spurred on by the integration of Thunderbolt enabled hosts. Numerous PC providers have all released the latest version of their hosts with Thunderbolt 3 support, including companies such as HP, Dell, Lenovo and Asus, all of which now offer mobile workstations featuring Thunderbolt 3 over USB-C connectors.

While the latest hosts provide Thunderbolt 3 connectivity via a USB-C connector, there is still a way to use a current Thunderbolt 2 devices with the latest PCs. In order to do so, users simply utilize a legacy adapter, such as the one developed by StarTech. Users will still be able to reach the full potential of Thunderbolt 2 products with these devices while futureproofing solutions by purchasing a Thunderbolt 3 host.

ATTO has a long history of being able to provide this connectivity via host bus adapters (HBAs) and network interface cards (NICs) that fit in hosts PCIe slots. With the latest generations of hosts, PCIe slots have now been replaced with Thunderbolt ports. Instead of internal connectivity via an ATTO HBA or NIC, external connectivity is provided with a Thunderbolt port and ATTO ThunderLink® adapter. ATTO still provides connectivity to Fibre Channel, Ethernet and SAS/SATA

storage and networks through the use of a Thunderbolt enabled device when a Thunderbolt host is involved.

ATTO Thunderbolt adapters focus on two main aspects—high performance and low latency—allowing users can collaborate with high availability. The overall result is a high value-add Thunderbolt solution with enhanced performance characteristics for storage connectivity that solves not only performance and throughput needs but also provides toolsets, solves lead times and compressed schedules, portability and personnel cost.