TECH BRIEF

ATTO

Technical Features

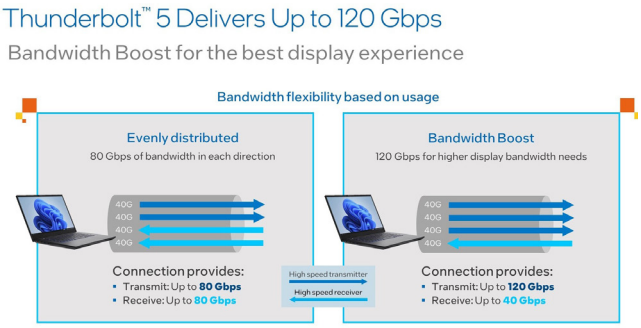
- 2X higher throughput compared to Thunderbolt 4
- Bidirectional bandwidth up to 80Gbps
- Bandwidth Boost mode that can reach up to 120Gbps for downstream bandwidth for display port monitors
- Thunderbolt 5 doubles the PCI Express (PCIe) data throughput to 64 Gbps (PCIe Gen 4), which is twice the performance of Thunderbolt 4.
- Backward compatibility with previous Thunderbolt and USB devices, ensuring seamless integration with existing hardware

Thunderbolt™ 5

Powering Next-Gen Workflows

Thunderbolt™ 5 is here and represents a major leap in performance over its predecessors, Thunderbolt 3 and 4. Thunderbolt 5 doubles the total bi-directional bandwidth to 80Gbps for data devices and offers up to 120Gbps for Display Port monitors. With support for PCIe Gen 4x4, Thunderbolt 5 provides a substantial increase in data throughput, up to 64 Gbps of actual data throughput, for a wide range of devices.

Thunderbolt 5 upgrades the underlying protocol support for DisplayPort 2.1 and also satisfies the latest USB-C specifications, all while maintaining backwards compatibility with previous versions of Thunderbolt 3 & 4.



The Bandwidth Boost reverses one of the available parallel receiving streams to send DisplayPort traffic instead. This data transmission flip combines to form 3 simultaneous 40Gbps transmitting streams to Display Port monitors, adding up to the total 120Gbps to provide the extra 8K HDR video output required.

This is at the expense of other Thunderbolt devices that may be connected to the same host port. Best practice is to connect Display Port or Thunderbolt monitors on separate Thunderbolt host ports from Thunderbolt devices such as the ATTO ThunderLink®.

Getting the Most from Thunderbolt 5: The Importance of Cables

In order to assure signal integrity at the faster clock speeds, a quality cable designated for Thunderbolt 5 use is required. While physically, it uses the same connector as USB-C, only official certified Thunderbolt 5 cables can carry the power delivery and maximum speed required by Thunderbolt 5. Standard passive cables can be up to 2m in length. Optical cables can be used if longer distances are needed.

Cables certified for use with Thunderbolt 5 will always be marked on the connector with the Thunderbolt icon and the number 5.

Thunderbolt™

Port	Cable
	

A Thunderbolt 4 or 3 cable can still be used to connect to Thunderbolt 5 devices, but performance will be limited. Connections using a slower, previous generation cable will negotiate down to the slower data transfer rates the cable is capable of.

Also, be sure to connect into the Thunderbolt ports on your host computers and not just USB-C ports. These ports will be marked by the Thunderbolt icon as well.

Understanding Thunderbolt 5 Port Icons

Thunderbolt has the ability to daisy-chain, or string together multiple devices in a series, where each device is connected to the next in line. A very welcome and helpful feature when connecting to laptops or small form factor systems with limited ports that require multiple connected devices or displays Most Thunderbolt devices have two ports in order to support the daisy chain.

Previously, either port on a Thunderbolt device could be used to daisy-chain interchangeably. With Thunderbolt 5, one port on a device, hub or dock is designated as the host port. This is to ensure proper power delivery. Some docks and hubs can delivery up to 140 watts of power to charge a connected host. The other port is dedicated for downstream daisy chaining. Host ports are marked by a new laptop/display icon next to the Thunderbolt icon near the port.

Port	Host Connection Port	Downstream Ports
Port Marking		

What Systems Connect to Thunderbolt 5 Devices?

While a system itself may have certified Thunderbolt ports, not all ports are made equal. For instance, the older Thunderbolt 1 & 2 systems that use the Mini DisplayPort connector are incompatible with Thunderbolt 5 devices. Even with the use of a Thunderbolt 2 to 3 converter dongle.

Moving up to Thunderbolt 3, the operating system has to provide support as well. This means Thunderbolt 3 systems can only connect to Thunderbolt 5 devices on Mac's if they are running at least macOS 15 Sequoia. Meanwhile, Windows 11 is required on PCs for Thunderbolt 5 device support.

Thunderbolt 4 systems are a bit more lenient when it comes to compatibility. Macs running at least macOS Sonoma 14.4 can connect to Thunderbolt 5 devices. As well as PCs with Windows 10, 11 or Linux distributions running at least kernel version 6.7.

	macOS 14.4+	macOS 15+	Windows 10	Windows 11	Linux kernel 6.7+
Thunderbolt 3	NO	YES	NO	YES	NO
Thunderbolt 4	YES	YES	YES	YES	YES
Thunderbolt 5	YES	YES	YES	YES	YES

About ATTO

For nearly 40 years, ATTO 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 bus 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.