

# ATTO ExpressSAS® Read Direct

TURBOCHARGE YOUR DATA TRANSFERS

Incremental improvements in performance are the norm when it comes to driver and firmware development. ATTO Technology Inc.'s ExpressSAS® RAID adapter products provide dramatic performance improvements—effectively doubling performance in certain environments.

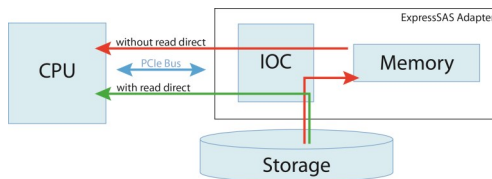
This paper describes the Read Direct data transfer model and how it impacts data transfer performance.

Reading data from a storage device typically involves a series of operations. The request for data comes down from the server processor (CPU), via the PCIe bus to the RAID adapter. The RAID adapter locates that requested data, reads it into memory on the adapter and then forwards it on to the CPU. This is a relatively simple series of operations, but it involves several components and latency while waiting for data to be aggregated and forwarded to the server CPU.

Read Direct operation streamlines this process, in certain circumstances, greatly improving I/O performance.

## READ DIRECT

Reading data does not change any information on the storage media, nor does it necessitate recalculation of parity information that is normally required when writing data. Nevertheless, in normal operation mode, a RAID adapter uses a similar sequence of operations whether reading or writing data. While necessary to ensure data integrity during writes, it can create inefficiencies for data reads.



What if it were possible to eliminate the inefficiencies of standard read operations? This is exactly what Read Direct provides.

As described above, data is typically read into adapter memory regardless of whether anything is actually being done to the data there. Since data is not manipulated during reads, this diversion to adapter memory creates latencies as an operation is initiated to move the data into and out of memory. With innovative driver code, ATTO has eliminated these inefficiencies.

## WHEN TO USE READ DIRECT

It is most useful when large, sequential blocks of data are being transferred. While there might be some performance improvement with smaller and/or non-sequential data, Read Direct is not especially effective in these environments. Typical applications for this type of data transfer includes video-on-demand, oil and gas exploration, medical imaging, broadcast and some database environments.

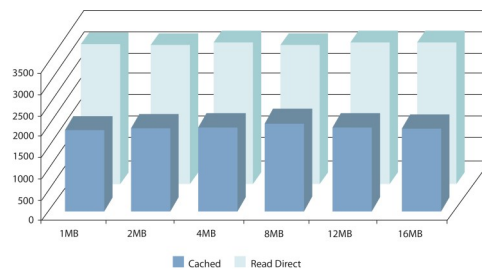
Read Direct is disabled by default on ExpressSAS RAID adapters.

## ENABLING READ DIRECT

Read Direct operation can be enabled, or disabled, using ATTO CLI Tools, a text-based command line shell used to manage ExpressSAS adapter settings. It is available for download from the ATTO web site. For more information on using Read Direct, contact ATTO Technical Support at support@attotech.com.

## SUPERCHARGED PERFORMANCE

As the chart below illustrates, Read Direct provides almost 2x performance over standard cached read operations. In this scenario, with eight solid state SAS drives attached to an ExpressSAS RAID adapter with pre-fetch set to two, traditional performance was approximately 1500 MB/sec. With Read Direct enabled, read performance was over 3000 MB/sec. Read Direct allows you to deliver more data, faster.



## ADVANTAGES

- RAID data protection
- Works with SAS solid state and HDD
- Doubles read performance
- Most useful for large transfer sizes and pre-fetch settings greater than one