

A Legacy of Accelerating Electronic Trades



As a trader, you know that our financial markets are continually evolving. With each passing quarter, trade execution times are decreasing. Today we measure trades using billionths of a second, known as nanoseconds (ns). Trading platforms leveraging older hardware and software often can't remain competitive as other traders continue to invest in the latest products which further reduce trade execution latency and improve order determinism.

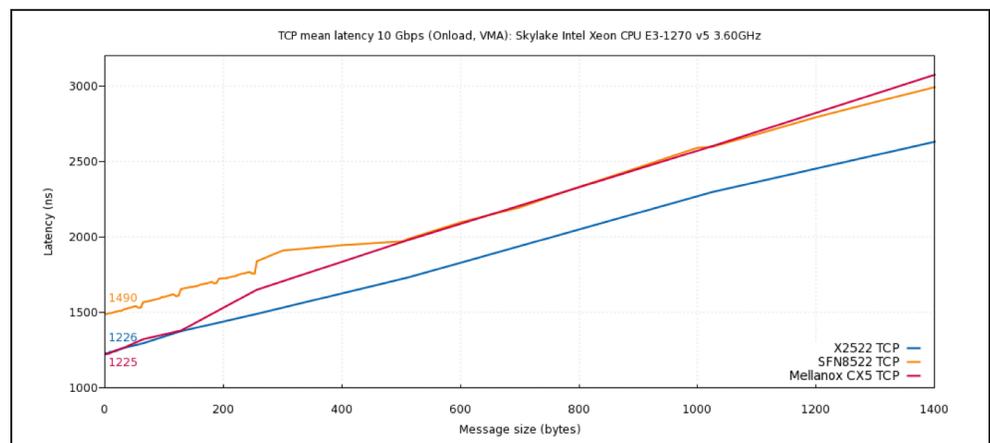


Flexibility vs. Latency

For the past decade, Solarflare has led the market in accelerating server-side UDP/TCP networking for electronic trading with our Onload® software acceleration stack. In addition, Solarflare has regularly delivered a new generation of 10GbE network adapters that have further reduced network latency by 20-30% while reducing jitter. Often these advances were the result of improvements in the hardware, but there were many significant enhancements to the Onload stack that contributed substantially to the overall system performance increases. Keep in mind that Onload is fully compliant to the BSD Sockets standard, which means that developers don't have to change their code to use Onload. Table #1 shows this reduction in Onload latency over time along with the gain from each new generation of Solarflare adapters.

YEAR	ADAPTER	ONLOAD (NS)	% GAIN
2010	SFN6122F	2,400	-
2013	SFN7122F	1,800	33%
2016	SFN8522	1,490	21%
2018	X2522	1,226	22%

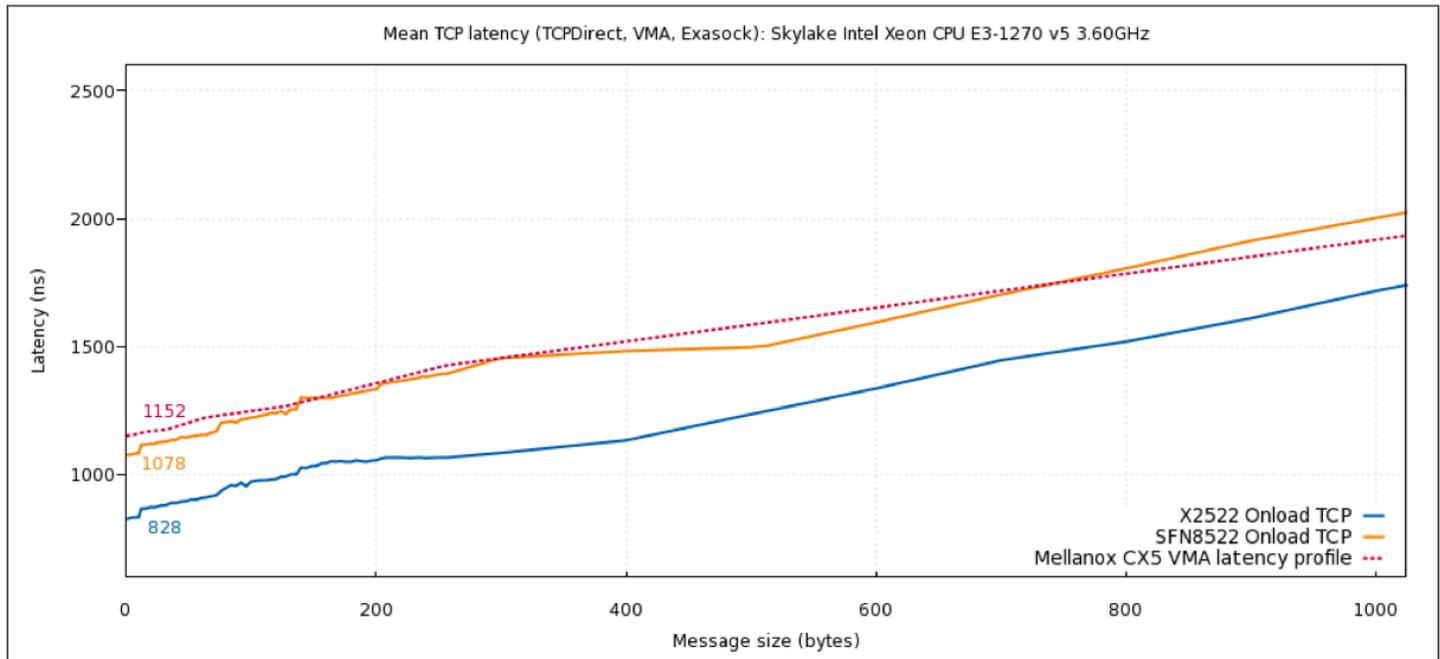
In the graph to the right you'll see how latency with Onload compares between Solarflare's SFN8522 and X2522 as message size increases. We've also included our next closest competitor, Mellanox, with their ConnectX-5 adapter and VMA offload stack.



Redefining High Performance

About five years ago, Solarflare saw an opportunity to revisit TCP/UDP networking stacks within Onload and determined that it is possible to squeeze another 35-50% in performance gains if developers were willing to use a new C language application programming interface (API). This new API was built from the ground up focused on performance, and it implements only a subset of the complete BSD Sockets API. Every API call has been highly tuned to deliver optimum performance. On the road to formulating this API Solarflare has patented several new innovations, and in 2016 it leaped forward again by introducing this API and branding it TCPDirect. Initially, TCPDirect improved latency on Solarflare's SFN8522 adapter by an astonishing 38%!

Recently TCPDirect was tested with Solarflare's latest X2522 cards, and it delivered an improved 48% latency reduction over Onload on the same adapter. Today TCPDirect with the X2522 provides an amazing 828ns of latency with TCP. So how does this compare with Mellanox ConnectX-5 and VMA with Exasock? The X2522 with TCPDirect is 39% faster! This gain is shown in the graph below. It should be noted that this testing was done using an older more performant Intel Skylake processor with a 3.6Ghz clock. Intel's newest Cascade Lake processors burst up to 4.4Ghz, but they were not available at the time of this testing. Recent early testing indicates that they should produce even more impressive results.



Solarflare X2522 Adapter Performs 39% Faster

The Importance of Time

Trading and time are interwoven into a single fabric, one cannot exist without the other. When trades are executing with a precision measured in nanoseconds you need a technology partner that is leading the industry, not following it. Solarflare provides a precision time protocol (PTP) daemon that includes both IEEE-1588 (2008) and enterprise profiles. Additionally, Solarflare provides an optional PCIe bracket

kit enabling the direct connection of an external hardware master clock that can provide a highly accurate one pulse per second (1PPS) signal. This kit and Solarflare's PTP daemon enable the adapter to maintain system time synchronization to within 200ns of the external master clock. Mellanox has stated that their PTP implementation "can see time locked to reference well within 500 nanoseconds of variation."

Proven Technology

Numerous STAC reports over the past decade with all the major OEMs and Linux distributions used in finance have validated that Solarflare networking technology is the standard by which all others are measured. Innovations like those discussed above are the reason why over 90% of the stock exchanges, global investment banks, hedge funds, and cutting-edge high frequency traders' architect their systems with Solarflare hardware and software. Outside of the Linux kernel's own communications stack, no other TCP/UDP user-space communications stack is more heavily tested than Solarflare's Onload platform. Today the world's financial trading economy exists across hundreds of thousands of servers spread throughout the globe, and nearly all of those servers depend on Solarflare to provide the industry's best performance with the lowest jitter possible.

STAC* Reports Validate Solarflare Technology is THE Measurable Standard

June 2018 – SFC180604b - UDP over 10GbE using Solarflare OpenOnload on Red Hat OpenShift 3.10 (pre-release) with RHEL 7.5 and Solarflare XtremeScale X2522 Adapters on Supermicro SYS-1029UX-LL1-S16 Servers

June 2018 – SFC180604a - UDP over 10 GbE Solarflare OpenOnload on Red Hat Enterprise Linux 7.5 with Solarflare XtremeScale X2522 adapters on Supermicro SYS-1029UX-LL1-S16Servers

October 2017 – SFC170831 - STAC-T0: Solarflare SFN8522-ONLOAD NIC with LDA Technologies LightSpeed TCP on an Alpha Data FPGA in a Penguin Computing Relion XE1112 Server

February 2017 – SFC170206 - UDP over 10GbE using OpenOnload on RHEL 6.6 with Solarflare SFN 8522-PLUS Adapters on HPE ProLiant XL170r Gen9 Trade & Match Servers

*Some STAC reports may only be available to subscribers.

For more information please visit:
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