T5 High Frequency Trading Report

Lowest Latency, Lowest Standard Deviation of Latency, Highest Message Rate

Overview

Chelsio is the leading provider of network protocol offloading technologies, and Chelsio's Terminator *TCP Offload Engine (TOE) with WireDirect* is the first and currently only engine capable of full TCP/IP, UDP/IP and Multicast offload at 1/10/40Gbps speeds.

Chelsio's WireDirect implementation provides zero-copy, kernel bypass and application polling capabilities from user-space for the fastest application response to network data. WireDirect UDP uses Chelsio's RDMA Queue Pairs semantics to expose a UDP socket layer API to the application, while WireDirect TOE TCP uses Chelsio's TOE Queues to expose a TCP socket layer API to the application. This allows user applications for TCP, UDP and Multicast to achieve lowest latency with higher message rates. Thanks to WireDirect using both hardware and software acceleration, it is uniquely capable of handling microbursts and providing deterministic performance.

Test Results

The STAC reports show that Chelsio achieves the lowest mean latency, lowest 99% latency, lowest standard deviation of latency and highest message rate of any report available.

The data below show Chelsio's solution delivers 500ns to 1us better latency and double the message rate seen in reports from other vendors.

Table 1 – UDP and Multicast Performance

UDP & Multicast	Measurement	WireDirect UDP
SupplyToReceive (us) @Base Rate 100K	Mean Latency (us)	3.119
	99P Latency (us)	3.664
	STDV Latency (us)	0.289
SupplyToReceive (us) @700K	Mean Latency (us)	3.112
	99P Latency (us)	3.716
	STDV Latency (us)	0.229
SupplyToReceive (us) @1.4M	Mean Latency (us)	3.196
	99P Latency (us)	4.227
	STDV Latency (us)	0.385
Throughput (msg/sec)	Max Rate (msg/sec)	1400000

** PRELIMINARY **

Table 2 – TCP Performance

TCP	Measurement	WireDirect TOE
SupplyToReceive (us) @Base Rate 100K	Mean Latency (us)	3.503
	99P Latency (us)	4.021
	STDV Latency (us)	0.217
SupplyToReceive (us) @700K	Mean Latency (us)	3.61
	99P Latency (us)	4.275
	STDV Latency (us)	0.265
SupplyToReceive (us) @1.4M	Mean Latency (us)	3.916
	99P Latency (us)	5.705
	STDV Latency (us)	0.499
Throughput (msg/sec)	Max Rate (msg/sec)	1400000

The tests were run using the Chelsio T520-LL-CR dual-port 10G Ethernet SFP+ WireDirect server adapter. For more details, please refer to UDP STAC Report and TCP STAC Report at http://www.stacresearch.com after free register/login.

Summary

The Chelsio T520-LL-CR adapter delivers unmatched message rates with low latency and jitter over standard Ethernet along with the lowest CPU utilization and power consumption, enabling the industry's best performance and scalability for financial services and other enterprise data centers. It also provides hardware offload for the IEEE 1588 Precision Timestamp Protocol.

Using Chelsio's WireDirect application acceleration middleware in combination with the T520-LL-CR to enable full operating system bypass dramatically reduces host processing overheads and enables high transaction rates while substantially reducing application latency and network jitter. WireDirect performs network processing at user-level and is binary compatible with existing applications that use TCP and UDP sockets. The T520-LL-CR network interface card satisfies all the requirements for superior low latency High Frequency Trading operations.

The Chelsio's custom T5 ASIC that powers the T520-LL-CR further supports protocol acceleration for RDMA/iSCSI/FCoE/NFS/CIFS. This makes the T520-LL-CR an ideal Unified Wire adapter, simultaneously accelerating processing for all protocols using the same card/driver/firmware.

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