



HPE Trade and Match Server Solution Accelerated with Mellanox ConnectX-4 Lx Adapters

Industry Standard STAC-N1 Benchmark Proves Competitive Advantage for Electronic Trading

INTRODUCTION

In the financial services market, success is measured by system speed, latency and jitter, ultimately translating into trade execution time. Additionally, the current regulatory environment has changed the way that Electronic Trading must work, demanding highly accurate timestamping, time synchronization, and requiring pre-trade risk checks. An Electronic Trading network must show that it monitors and controls the data that passes through it, down to the sub-microsecond level.

Mellanox Ethernet solutions for Electronic Trading have repeatedly demonstrated the lowest and most consistent application latency, higher application throughput, and better scalability in benchmark testing.

HPE provides two different Trade and Match server platform for Electronic Trading applications: Apollo 2000 Systems, a flexible 2U shared infrastructure that can accommodate up to four ProLiant XL170r; and ProLiant DL380 Gen10 in 2U form factor. Apollo 2000 Gen9 and DL380 Gen10 servers are optimized with custom BIOS and configuration tools enabling over-clocked processors delivering an efficient, density-optimized platform in a traditional rack mount form factor.

The HPE Trade and Match Server solution is designed to minimize system latency, tuned and optimized for improved performance specifically for Electronic Trading operations. HPE ProLiant Servers enabled with Mellanox adapters and VMA acceleration software have consistently delivered high performance solutions to leading exchanges, investment banks, and hedge funds, and together the companies continue to innovate to meet the demanding needs of tomorrow.

SOLUTION HIGHLIGHTS

- Mellanox and HPE maintain exceedingly low latency while maintaining high message rates through hundreds of connections
- Sub-millisecond time precision over shared network links for maintaining highly accurate regulatory time stamping
- Industry's lowest latency and jitter sustained at highest message rates, as validated by STAC-N1 benchmark
- Meeting high regulatory requirements with highly accurate hardware timestamps and sub-microsecond time synchronization across servers
- High performance solution in mainstream packaging

HIGH PERFORMANCE NETWORKING

Mellanox is the world's leading provider of high speed server connectivity solutions, with an adapter portfolio supporting 10/25, 40, 50 and 100 Gb/s speeds. Mellanox high-performance interconnect solutions enable the highest throughput & lowest latency financial data centers, including the world's largest stock exchanges, investment banks and prop traders.

Mellanox VMA, an open source, fully-compliant messaging accelerator software, boosts performance with kernel bypass technology. The new VMA 8.x has been completely overhauled, delivering an improved out-of-box experience, eliminating jitter and outliers, and streamlining ease of use. Applications using the VMA library gain many benefits when compared with standard kernel network stack, including:

- Up to 80% Lower latency
- Up to 90% Lower Jitter
- Improved CPU utilization with up to 85% Fewer Cores on IO Processing
- Higher throughput with bandwidth up to 100Gb/s per port

In addition, Mellanox adapters provide accurate hardware timestamps to a variety of NTP/PTP client applications, which in turn guarantee highly accurate global synchronization across trading platforms. This assures sub-microsecond time precision, even over shared network links. For high quality links and time feeds, applications can see time locked to reference well within 500 nanoseconds of variation.

By choosing HPE Trade & Match Server solution with Mellanox high-performance interconnect your network is assured of always being at the cutting edge of data center technology.

MAINSTREAM PACKAGE

Mellanox provides a unique combination of high performance in a mainstream package. Mellanox adapter cards are available and supported across the HPE server portfolio, they are supported by all mainstream operating systems, including Windows, and all major Linux distributions, without requiring kernel modifications or proprietary drivers. This means that companies can implement Electronic Trading solutions with their organization's standard hardware and operating system configurations, saving greatly on capital and operational expenditures, while reducing risk of security breaches.

PERFORMANCE BENCHMARKS

For performance benchmark, industry standard STAC-N1 is used. The STAC-N1 toolset tests a network stack using a market data style workload. STAC-N1 is designed to provide insightful network benchmarks that are neutral with respect to vendor, network API, and network transport. STAC-N1 can test many different combinations of network API, I/O mode, network stack, operating system, and system hardware.

The benchmark was run on HPE's Trade & Match server (Figure 1) with HPE certified 10/25GbE Mellanox ConnectX-4 Lx adapters and Mellanox VMA software. Figure 2 shows the Stack Under Test (SUT).



Figure 1: HPE Trade and Match Server with 10/25GbE Mellanox ConnectX-4 Lx adapter

UDP using the udp-tcp-sock-v1.0.3 binding for TAC-N1
SUSE Linux Enterprise Server 12 SP2 with Mellanox VMA 8.4.3
HPE ProLiant XL170r Gen9 with HPE overlock utility
1 x 8-core Intel® Xeon® CPU E5-1680 v 3 @ 4.5 Ghz
HPE Ethernet 10/25Gb 2-port 640 SFP28 Adapter
25 Gbps Ethernet by cross-over cable

Figure 2: Stack Under Test (SUT)

STAC REPORT™

Compared to all other public STAC-N1 reports of Ethernet-based SUTs, the SUT demonstrated:

- **Lowest mean latency** at both the base rate and the highest rate tested.
- **Lowest max latency** at the base rate.
- **Lowest max latency** at or above 1 million messages per second.
- **Highest max rate reported: 1.6 million** messages per second.
- **99.9999th percentile latency** (six nines) of just 5 µsec at the base rate and 6 µsec at 1.6 million messages per second.

STAC-N1™ Benchmarks B1, October 2017. Mellanox Connect-X4 Lx VMA 8.4.3

Figure 3 shows the max latency over time and Table 1 shows the summary stats of test sequence run at base rate of 100K messages/sec.

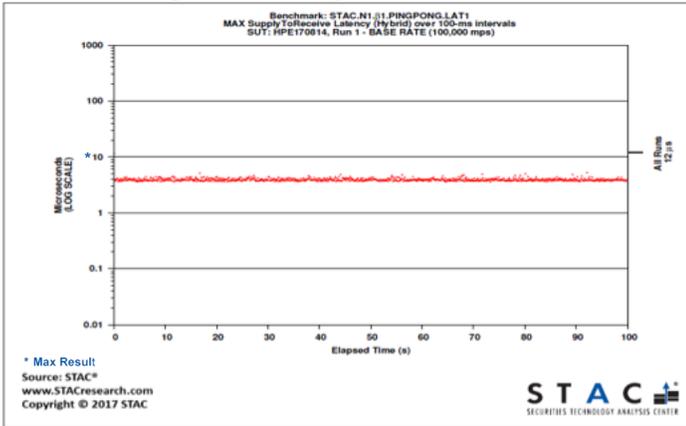


Figure 3: Max Latency over time at BASE Rate (100K messages/second)

STAC Benchmark™: STAC-N1.1.PINGPONG.LAT1 SUT: HPE170814						
RATE (messages per second)	Latency statistics (microsecond)					99th Perc
	Mean	Median	Std. Dev	Minimum	Maximum	
100,000	2.5	3	0.1	2	12 ¹	3
Supply-Rate Jitter, Run 1: 0.0%			Supply-Rate Jitter; Run 2: %			

Table 1: Summary Stats for BASE RATE runs

Figure 4 shows the max latency over time and Table 2 shows the summary stats of test sequence run at MAX RATE of 1.6M messages/sec.

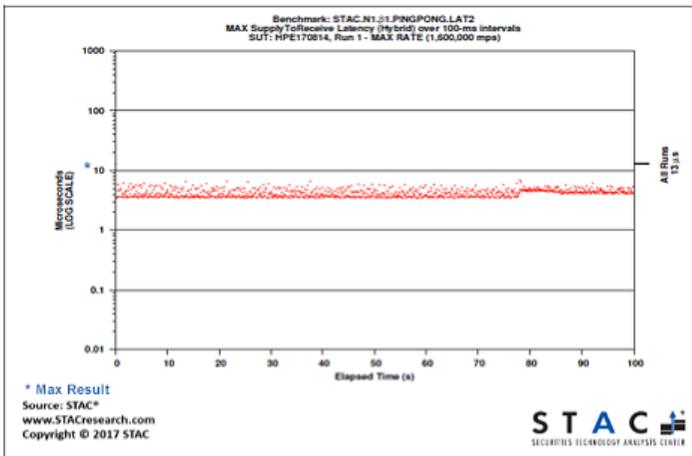


Figure 4: Max Latency over time at MAX Rate (1.6M messages/second)

STAC Benchmark™: STAC-N1.1.PINGPONG.LAT1 SUT: HPE170814						
RATE (messages per second)	Latency statistics (microsecond)					99th Perc
	Mean	Median	Std. Dev	Minimum	Maximum	
1,600,000	2.6	3	0.2	2	13	3
Supply-Rate Jitter, Run 1: 0.0%						

Table 2: Summary Stats for MAX RATE runs

The STAC-N1 benchmark shows that in conditions that simulate HFT environments, Mellanox and HPE clearly manage to maintain an exceedingly low latency while maintaining high message rates and hundreds of simultaneous connections.

Summary

In the world of Electronic Trading, solutions require high-performance at the lowest possible latency and jitter to be competitive. Mellanox & HPE solutions have been deployed in a large array of investment banks, hedge funds, and exchanges because they provide the highest bandwidth, the lowest latency, and, ultimately, the best return on investment.

As the benchmarks show, Mellanox Ethernet NICs are an ideal match for HPE’s Trade and Match Server Solution; together addressing the most demanding needs for the financial services industry. The HPE- Mellanox adapter portfolio deliver a powerful combination of performance with the cost and convenience of commodity networking.

About Mellanox

Mellanox Technologies is a leading supplier of end-to-end InfiniBand and Ethernet interconnect solutions and services for servers and storage. Mellanox interconnect solutions increase data center efficiency by providing the highest throughput and lowest latency, delivering data faster to applications and unlocking system performance capability. Mellanox offers a choice of fast interconnect products: adapters, switches, software, cables and silicon that accelerate application runtime and maximize business results for a wide range of markets including high-performance computing, enterprise data centers, Web 2.0, cloud, storage and financial services.

To find out more, visit our website: www.mellanox.com



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