

Server performance and reliability in Financial Trading Applications

How the **Vespertec 511-HFT SuperServer** gets the critical balance right in the delivery of a stable platform for a dynamic market.



Executive Summary

Time is money, and no more so than in financial markets. This is a sector where even a few nanoseconds can mean the difference between significant profits or losses. Hence the rise of High Frequency Trading (HFT), which depends on algorithms, automation and extreme performance technology to analyse market conditions and execute large batches of trades at lightning speed.

A high-risk strategy

To meet HFT demands for ever-faster speed, specialist suppliers have turned to overclocking to push servers to their absolute limits. To achieve such extreme performance, manufacturers' specifications are routinely exceeded, with systems operating beyond the safety net of original equipment manufacturers' supported parameters. As one might expect, equipment failures, including premature processor burn-out, and consequent downtime and lost trades, are not uncommon.

Even so, overclocked servers are still marketed with the promise of "high reliability". Feedback from the market is often to the contrary, however: this is "high reliability" tinged with "high risk", rather than "high reliability" delivered with certainty.

A better solution

Many traders seem resigned to this level of risk to equipment reliability, and to their business and reputation, in the pursuit of performance, profit and competitive edge.

Accepting that the HFT market is driven by an unceasing need for speed, is there a better solution? On the following pages we present the powerful yet pragmatic alternative: the **Vespertec 511-HFT SuperServer**. It's a solution that achieves the critical balance of financial application performance with true high reliability, manufacturer warranty assurances and mitigated risk.



Introducing the Vespertec 511-HFT SuperServer

A dynamic market need met through a unique collaboration

As a specialist in delivering accelerated performance for the data centre (including for a large number of financial sector and fintech organisations), Vespertec has long been aware of client concerns surrounding overclocking in the HFT market. This has led Vespertec to work closely with one of its primary vendors, Supermicro, to develop a sustainable solution to HFT traders' need for extreme performance.

The result of Vespertec's rigorous assessment of the performance and reliability needs of the HFT market is the unique **Vespertec 511-HFT SuperServer**, designed using the 1U Supermicro 511E-WR Single Socket Intel® Xeon® scalable Gen 4 system. It's a solution that redefines high availability in extreme performance HFT computing environments by perfectly balancing performance and reliability.

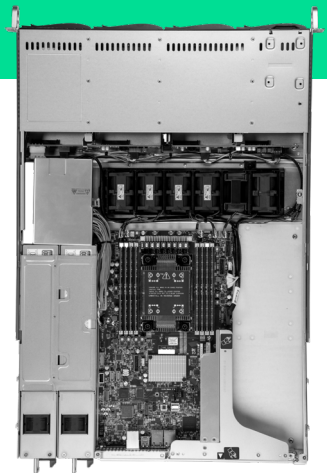
Extreme performance with sustainability

Expertly configured, performance-optimised and fully tested and benchmarked by Vespertec engineers, the 511-HFT is a dedicated high frequency SKU utilising the performance gains of the Intel® Xeon® Scalable Gen 4 platform. The 511-HFT operates within both Supermicro and Intel specifications for full warranty cover.

Critically, this is not an overclocked product – and Vespertec is not an “overclocking” solution provider. Uniquely, Vespertec is a specialist in the design, configuration, delivery and support of open, high performance data centre infrastructure. An important part of the Vespertec offer is the fusing of its close vendor relationships and its own in-house system, build and test facilities and expertise — the benefits of which shine through clearly in the Vespertec 511-HFT SuperServer.



The 511-HFT redefines high availability in performance compute environments by perfectly balancing performance and reliability.



Mitigating risk

Financial institutions generally — and HFT traders specifically — have seen how incredibly difficult it is to achieve even 12 months' reliable overclocked performance, let alone five years. Processors frequently burn out due to running outside of the processor vendor's specifications. The same is true of memory and system boards, with users often experiencing phantom reboots, memory corruptions and a level of reliability that is far from suited to tier 1 financial co-location applications.

Large financial organisations looking to lower and mitigate their risk, while still benefitting from high performance, would be wise to assess and trial the Vespertec 511-HFT SuperServer.

10 key benefits that set the Vespertec 511-HFT SuperServer apart

1. Designed specifically for HFT workloads with BIOS optimised accordingly
2. Near-overclocked low latency performance with true high reliability
3. Reduced power consumption versus overclocked alternatives
4. Air cooled for standard deployment
5. Compact form factor requiring minimal rack space
6. 3–5 year Supermicro warranty options
7. Cost-effective solution ideally suited to the financial sector
8. Global supply, logistics and support from Vespertec
9. Flexible hardware break-fix solutions and SLAs available in all major financial centres
10. Hardware compatible with next generation Intel processor architecture.



Warrantied performance at the near-overclocked level

The Vespertec 511-HFT SuperServer offers comparable performance to leading overclocked servers, yet with true high reliability and peace of mind built in.

It is configured specifically for low latency, with PCIe, memory, and core-to-core latencies at the near-overclocked level. Yet there is no overclocking and no compromising of manufacturer specifications or warranty cover.

Whilst on the face of it the single core frequency of 4.0 GHz is slightly lower than the overclocked

Intel Xeon W-based options on the market, the uncore frequency in the platform is 3.6 GHz with the 6444Y processor. This higher uncore frequency delivers a multitude of benefits for a variety of workloads.

The instructions-per-cycle (IPC) rate of Intel® Xeon® Scalable Gen 4 is a great improvement over its predecessors, and once locked in the higher frequencies the IPC rate of the 6444Y processor in the Vespertec 511-HFT system can be up to double that of the previous generation.



Higher uncore frequency than previous generations.

VESPERTEC 511-HFT SUPERSERVER SPECIFICATIONS

Processor

- Intel 6444Y Xeon 4th Generation Processor
- 16-cores @ 4.0 GHz
- Base Frequency 3.6 GHz (Uncore/TSC) 16C
- Base Frequency 3.8 GHz (Uncore/TSC) 8C

Storage

- 1 x Micron 5400 PRO 480GB SATA 2.5" (7mm) SSD
- 1 x Micron 7450 PRO 960GB NVMe M.2 (22x80) SSD

Memory

- 8 x DDR5 DIMM Slots (1DPC)
- As tested: 8 x Micron DDR5-5600Mhz RDIMM 96GB 2Rx4 CL46 (24Gbit)

PCIe

- 1x PCIe 5.0 x8 LP
- 2x PCIe 5.0 x16 FHFL or 1x PCIe 5.0 x16 FHFL DW (for GPU/FPGA)
- As tested: 1x Xilinx Xtremescale X2522 PLUS Controller

Network

- 2x 1Gb RJ45 Onboard
- 1x Dedicated RJ45 BMC/IPMI Port

Chassis

- 1U Air Cooled
- Redundant 800/860W Power Supplies

Management

- Onboard IPMI 2.0 BMC Baseboard Management Controller.



Up to 99.999% availability and reliability

Available with 3–5 year warranty options, the Vespertec 511-HFT SuperServer can provide up to 99.999% availability and reliability. That's because the system is configured within the CPU specifications set by the CPU vendor. Furthermore, Vespertec engineers have carried out numerous stringent benchmarking tests (see table below) under real-world conditions.

Taking everything into account, Vespertec has taken a huge step towards ensuring that the MTBF of HFT systems can now be measured with a calendar, and not a wrist watch.

VESPERTEC 511-HFT SUPERSERVER BENCHMARKING PERFORMANCE METRICS

Test	511-HFT SuperServer	Notes
Core-to-Core Latency	93 ns	Minimum round trip latency between threads on core x to core y (tested all to all)
Memory Latency	94.9 ns	Latency measured with Intel MLC
PCIe Latency	444 ns	Round trip latency measured to Slot 1 (first direct wired slot)
Core Frequency	4.0 GHz	Frequency of cores
Uncore/TSC Frequency	3.6 GHz	Frequency of uncore/base TSC frequency
Memory Frequency	4800/5600 MT/s	Frequency of memory
IPC	4.93 IPC	Instructions per cycle measured with perf

Global supply, logistics and support

Supplying its solutions globally, Vespertec is a unique direct channel not just to innovative server/compute solutions but also to complementary networking and storage products.

Alongside Supermicro, Vespertec's partner vendors include world-leading names including NVIDIA and VAST Data, and many more. These relationships ensure the closest possible technical collaboration, as well as price competitiveness and the highest levels of post-sales support, vendor engagement and troubleshooting.

Vespertec is also a specialist in data centre logistics with extensive experience of project managing the delivery of data centre infrastructure around the world, including to countries with complex logistical and taxation regulations.

This is backed up with 24/7 global support, with SLA options to match the precise needs of each customer. Every package features phone and email technical support desk access — and via people who speak the customer's local language. Support can range from advanced parts exchange to 24x7x4 hour engineer to site.



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