

## NEC Improves Scalability with Intel E7 — Delivering Increased Performance and Reliability

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### Management Summary

Everyone knows that the whole is greater than the sum of its parts. This is especially true in team sports, where no one player can win a game on his own. It requires teamwork and the effort to improve your performance from game to game, from year to year. This is evident from the performance, for example, of the Miami Heat, who added two star players to their roster during the off-season; two very good players who had led their own teams to a measure of success in previous years. Everyone expected them to win practically every game. However, at the beginning of the season, they were not used to playing with one another. They came out of the gate slowly: win one, lose one. Then, as the season wore on and they had more time to practice with each other, the wins became more frequent and the losses rare. Individuals, even stars, cannot carry a team to victory by themselves; it requires players who know what their teammates are going to do at any given moment so that they can adjust their game to the circumstances at hand. We saw this with the Boston Celtics who assembled a similar “Big 3” a few years ago and rode them to a championship, once they knew what to expect from the rest of the team.

The same thing is true in the business world, where we see competitors joining hands to improve their individual products in a form of *cooperation*. We have seen this come to fruition in the data center frequently with companies that compete in the world of Information Technology for enterprise dollars. We have seen NEC team-up with Stratus and Intel to deliver a better Fault Tolerant system, based upon the Intel *Nehalem* architecture, in order to improve performance and virtualization so that the enterprise can reduce server sprawl in mission-critical environments. A good example is where failures could cause the loss of life, such as in a law enforcement or medical environment. These partners combined resources to help consolidate diverse applications on an architecture designed to keep running through component failures. NEC and Intel have teamed up many times before, in order to deliver better technology to the data center in support of business-critical applications. We saw that in 2000 with the launch of the first 16-socket server for *Windows* and *Linux* platforms with record-setting performance. We saw it again in 2003 with innovation in a 32-socket configuration. Now, we see this partnership taking one more giant step forward with the introduction of the Intel *Xeon Processor E7* architecture, known internally as *Westmere EX*, into NEC’s *Express5800* family.

With Intel’s E7 architecture, the Express5800 can deliver higher clock speeds and more cores, along with more memory, to enable higher levels of consolidation and virtualization. Combined with NEC’s enhanced reliability experience and extended security, this team has delivered an ideal platform for the business-critical, web-facing applications that the data center depends upon to keep the enterprise operational. To learn more about NEC’s Express5800, please read on.

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## The Business-Critical Data Center

In 2011, the data center continues to have an insatiable appetite for processing power, but, unfortunately, it also has a limited budget and limited resources. The IT staff is under constant pressure to meet customer requirements, both internal and external, that were established in a less demanding environment. This requires a constant refreshing of the processing environment, not only in the data center, but throughout the enterprise as well.

Today's data center, with a 24x7 interface to the Internet, has no tolerance for downtime. Performance, reliability, and security are critical. Customers, partners, and users alike expect improved service levels even while the IT staff is faced with operating with the same budget as last year, at best, and as they struggle with an expanding infrastructure, both physical and virtual, additional users, and an increase in complex applications.

Enterprises across the board are demanding a higher level of performance and reliability for their critical applications. This includes financial institutions on Wall Street, as well as global banks, telecommunications, the entertainment industry, and manufacturing enterprises of every kind. None of these has exactly the same environment. Any downtime equates to lost revenue – millions of dollars per hour, in many cases, as customers go elsewhere to execute their transactions. If business comes to a stop because of a failure in the IT infrastructure, or if information is stolen, jobs will be lost – perhaps yours.

All industries are becoming more and more dependent on the innovative advances being made in digital technology, just to maintain last year's capabilities. An expanding number of cores is needed to enable the IT staff to consolidate and virtualize the environment, enabling every enterprise to improve the utilization of its IT resources. More cores per processor, along with an increase in the amount of memory available, really make a difference here. For example, advances in high-definition and 3-D techniques are requiring higher-performance platforms to develop and edit the content TV shows and movies need, that we, as consumers, demand, but not without a high cost in consumed resources, i.e., processors and memory.

Server sprawl likely is inhibiting the performance of your IT infrastructure. It raises the TCO of your IT environment through wasted

resources because of poor server utilization, excessive energy consumption, and an IT staff overburdened by the administration of a complex and under-performing architecture. Virtualization, using the latest technology, helps to offset these issues, lowers the TCO of the data center, and improves the commitment to the SLAs.

An aging and inefficient infrastructure leads to more server complexity, as it tries to conform to evolving business processes. This complexity can delay the deployment of business-critical applications, increasing the time to revenue. This lost time and effort results in missed opportunities, as the enterprise that has refreshed its IT architecture first becomes the "early bird" who attracts the next client. Trying to manage a complex environment often results in more time and money being spent on maintenance and administration than on new application development and deployment. In fact, when 70% of the IT budget has to be dedicated to operations and maintenance, only 30% can be invested in business innovation.

What is needed to refresh and simplify data center operations? The answer to that is, well, "simple". The data center needs a *simplified* infrastructure that can reduce the waste in IT and energy resources. The IT staff needs a *simplified* architecture that virtualizes, consolidates, and, well, *simplifies* all of the business-critical application platforms in the data center.

To achieve this, the IT staff needs to deploy a platform that integrates the latest in server design with the newest processors available, in order to improve performance, reliability, and energy consumption. For those data centers that are maintaining an aging, patchwork architecture, there is a better way. With their latest announcement, NEC has combined the newest microprocessor from Intel's labs, the *Xeon E7*, with the latest in server architecture, the *Express5800 A1080a*, to simplify data center operations. The business-critical applications within your data center require more processing power through higher clock speeds, more performance through more cores, a more reliable system with enhanced security, and, last but not least, the ability to accomplish this within the same power envelope, or less, as existing servers.

## The Intel Xeon E7 Processor

Once again Intel has raised the ceiling of processor performance and functionality. The

*Xeon E7* family, known internally as *Westmere EX*, has been designed to provide the data center with a top-of-the-line enterprise-level server to manage and secure crucial business-critical applications, while exceeding the demands of most mission-critical IT environments. The E7 family uses the Intel *Xeon Processor 7500 (Nehalem)* as a springboard to deliver the ideal combination of performance and scalability<sup>1</sup> for your most demanding workloads, using a *scale-up architecture*. Scale-up enables the deployment of fewer, more powerful servers with the capability to handle more demanding applications, with built-in headroom to handle peak loads and normal growth. In fact, some enterprises that run their proprietary, mission-critical applications on RISC<sup>2</sup> processors, such as HP's *Itanium*, IBM's *POWER*, and Oracle's *SPARC*, will have to weigh the high costs and complexity of migrating to an open x86 environment with Linux against the expected performance gains.

These top-of-the-line processors lend themselves to be ideal performers for your most demanding database and transaction processing workloads. With improved scalability and increased memory and I/O functionality and capacity, you can adapt readily to changing short-term business demands while addressing the requirements of long-term business growth. The E7 family enables the data center to consolidate and virtualize their most critical servers, while advanced reliability and security features work to maintain data integrity, accelerate encrypted transactions, and maximize the availability of business-critical applications, all within the energy envelope of 130 watts from the previous (*Westmere*) CPU. In addition, the multi-core E7 enables the data center to lower the TCO of the IT infrastructure with up to 95% lower operating costs on four socket servers than traditional single-core CPUs.

In comparison to the *Xeon 5600*<sup>3</sup>, the E7 has outstanding functionality with up to 10 cores per socket as compared to 6 for the 5600. Each E7 socket supports up to 20 threads and up to 16 low power DIMMs (up to 4TB for 8 sockets) with 30 MB of shared L3 cache. This compares quite favorably over the *Xeon 5600* with up to 6 cores, 288GB of memory, and 12MB of L3 cache. In addition, the E7 has more memory lanes for per-

formance and includes memory buffers, enabling the system to keep the clock speed constant. The E7 also includes a Memory Check Architecture, to improve reliability while it retains the *Xeon 5600* capabilities in terms of interconnect (QPI), memory type (DDR3), and micro architecture (*Nehalem*). It also retains many of the same innovations from the 5600: *Intel Turbo Boost*, *Intel Hyper-Threading*, *Intelligent Power*, and *Intel Virtualization*. The E7 improves upon the reliability, expandability, scalability, and I/O capacity of the 5600. In addition, the E7 delivers the same reliability and data security as the *Intel Itanium Processor 9000*.

In terms of RAS, the E7 has advanced features that help to protect both systems and data more effectively, lowering the TCO by reducing the need for malware protection and protecting the enterprise from data breaches and data loss. These include seven new *Advanced Encryption Standard New Instructions (AES-NI)*, to reduce the performance penalty usually experienced with pervasive encryption, while enabling encryption software to run faster, with better data protection. In addition, the E7 includes the *Intel Trusted Execution Technology (Intel TXT)* to increase malware protection through measured launches into "known good states". Intel TXT enforces control of the platform, enabling isolation in the boot process and while complementing runtime protections.

### NEC's Express5800 Platform

NEC has adopted the Intel E7 processor within their *Express5800* family where they have delivered on all of the promises of the Intel processor. Specifically, they have announced support of the E7 for the *Express5800/A1080a*. In doing so, they have protected the investment made by NEC's customers in previous versions of the A1080a by announcing field upgrades of that platform to the E7-8800 processor.

The *Express5800/A1080a* has been designed with a chassis common to the *Express5800* already deployed with Intel's *Nehalem EX* processor, and supports industry standards to lower costs for the data center, including a glue-less design in order to minimize the number of integrated circuits required to interface to other CPUs. (See Exhibit 1, on the next page.) The A1080a also uses an intelligent QPI BIOS, and machine-check autonomic reliability. NEC also takes advantage of the lessons learned in deploying their fault tolerant versions of the

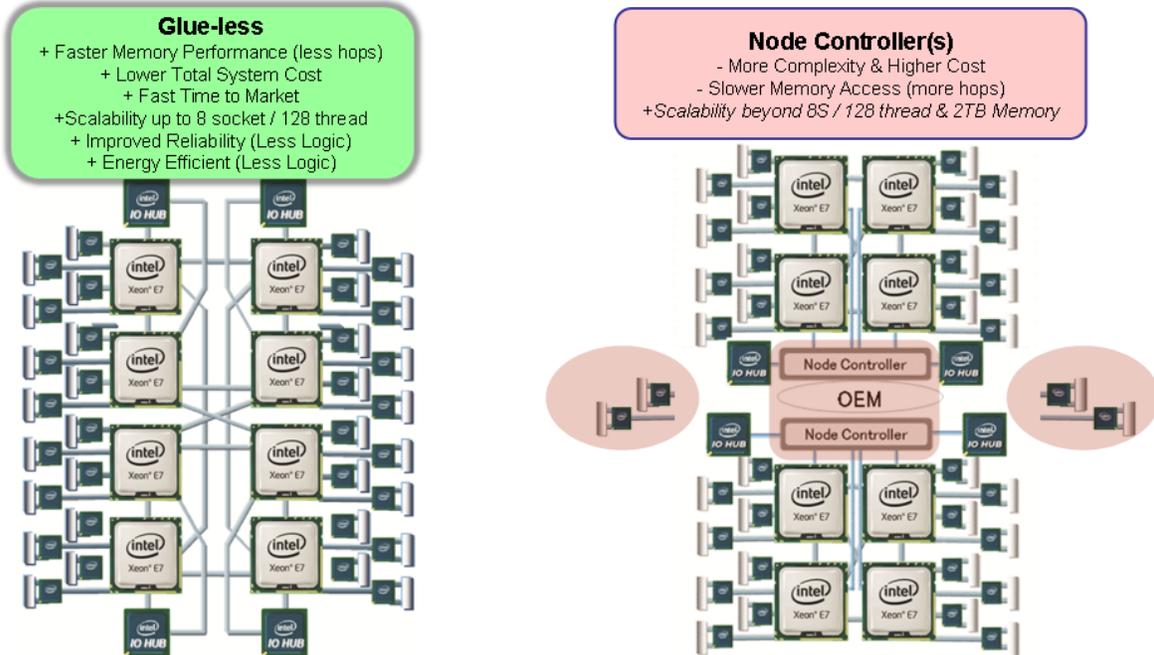
<sup>1</sup> The E7 can be configured with 2 to 256 sockets.

<sup>2</sup> Reduced Instruction Set Computing.

<sup>3</sup> *Westmere EP*.

**Exhibit 1 — NEC's “Glue-less” Design**

With 4 Generations of Node controllers in Itanium and Xeon systems, NEC choose to implement a glue-less design because of the performance, reliability, time to market, and cost advantages.



Source: NEC

Express5800<sup>4</sup> to deliver on improved reliability for the standard version of the Express5800. The A1080a provides support for Microsoft *SQL-Server 2008*, as well as *VMware*, and *Red Hat Linux*.

The NEC Express5800/A1080a delivers exceptional reliability, speed, performance, and security for the enterprise data center by first taking advantage of the inherent capabilities of the E7. The enterprise data center can deploy the A1080a with up to eight Intel E7 processors, enabling the platform to support from 8 up to 160 separate processing threads and from 16GB of memory all of the way up to 2TB. This makes the A1080a an ideal vehicle for the consolidation and virtualization of the enterprise data center infrastructure, especially for transaction processing and compute-intensive database applications. It has modular in-box partitioning in an innovative 7U chassis, incorporating supercomputer and mainframe-inspired features to improve the reliability in high-availability environments.

The A1080a is available with a choice of Intel Xeon E7 processors, from the X8830 running up to 8 cores at 2.13GHz with 24MB of cache, to the X8870, running up to 10 cores at 2.4GHz with 30MB of cache (3MB/core). The X8870 consumes 130W, while the X8830 uses only 105W. The maximum amount of memory for the A1080a has been increased to 2TB, using Intel's 7512LV<sup>5</sup> memory buffer along with a 32GB memory option.

NEC has added a 300GB SAS HDD running at 15K RPM, and 450GB, 600GB, and 900GB 10K SAS drives, for additional storage for the Express5800. NEC continues support for SSDs, further improving performance.

The Express5800 server also helps to lower the TCO of the IT infrastructure by replacing at least two previously installed systems, saving valuable rack space and lowering energy costs as a result of advanced partitioning power cooling technology.

**Conclusion**

With new RAS features, such as the Trusted

<sup>4</sup> See **The Clipper Group Navigator** entitled *Fault Tolerance for the Windows Environment – When It Positively, Absolutely Has to be There* dated April 26, 2007, and available at <http://www.clipper.com/research/TCG2007056.pdf>.

<sup>5</sup> Low Voltage.

Execution Technology and new AES instructions, higher processor speeds, improved security, and a lower power requirement, NEC is providing the enterprise data center with the increased performance, reliability, security, and energy conservation that businesses require to remain on-line with the resources required to service their Internet community. With the Express5800 A1080a, NEC is delivering a platform capable of higher levels of consolidation without negatively affecting the energy or space requirements of the data center.

The Express5800 A1080a will enable the enterprise to lower both CapEx and OpEx infrastructure and licensing costs. NEC also provides the data center with a single point of contact for all of their server, storage, and services requirements.

With improved performance, more power, higher reliability, improved security, and a lower energy requirement, the NEC Express5800 A1080a provides the enterprise with everything they need to improve the consolidation and virtualization of the data center. With a common architecture, the A1080a enables developers to minimize the size of their test and development environment, in order to ensure predictable results. If you would like to deploy these features throughout your data center, the A1080a may help you to improve your bottom line as well.



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