



News Fact Sheet

Intel® Xeon® Processor E5-2600 Product Family

Top Technologies that will Boost Data Center's Performance, Efficiency and Security

March 6, 2012 — The record-breaking Intel® Xeon® processor E5-2600 product family deliver leadership performance,^{1,2} best data center performance per watt^{1,3} and breakthrough I/O innovation and trusted hardware security features to enable IT to scale. These processors are not only at the heart of servers and workstations, but will also power the next generation of storage and communication systems.

Leadership Performance with Best Data Center Performance Per Watt

Supporting up to eight cores per processor and up to 768GB of system memory, the Intel Xeon processor E5-2600 product family increases performance by up to 80 percent^{1,2} compared to the previous generation Intel Xeon processor 5600 series.

- **Intel® Advanced Vector Extensions (Intel® AVX):** These instructions increase floating point operations per clock up to two times⁴ for technical, financial, scientific and content creation applications. They double the size of the register used to process the instruction up to 256 bits allowing the CPU to do more work every clock cycle.
- **Intel® Turbo Boost Technology 2.0⁵:** This technology allows the processor to increase frequency at the request of the operating system (OS) to handle workload spikes as well as shift power across the processor. For example, if one core is doing all the work while another is idle, the processor could “turbo up” by redirecting power from the idle core to the active one. With the Xeon processor E5-2600 product family, this technology enables even higher turbo speeds. The top Xeon processor 5690 with one active core could turbo up to 266 MHz while the E5-2690 can increase frequency up to 900 MHz.
- **Intel® Node Manager:** This server power management technology runs dynamic, policy-based management algorithms to improve data center energy efficiency. Intel Node Manager provides a streamlined server instrumentation solution, taking advantage of lower level data and controls available in the processor, OS, Baseboard Management Controller (BMC), and other subsystems to manage system power and enable capabilities such as load migration. The policy can be updated while an OS is running, enabling real-time updates without affecting server availability. With Intel Node Manager, IT managers can monitor actual server power and thermal behavior and set upper limits on server power to increase rack density or energy efficiency.
- **Intel® Data Center Manager (Intel® DCM):** This power management solution stack builds on the Intel Node Manager and a customer's existing management console to aggregate node data across the entire rack or data center to track metrics, historical data

and provide alerts to IT managers. This allows IT managers to establish group level power policies to limit consumption, while dynamically adapting to changing server loads. Data centers can increase rack density, manage power peaks and adjust the power and cooling infrastructure based on the data from the DCM. Intel Data Center Manager, enabled through partnerships with third party management consoles, allows for even more automated control via IT policies. IT managers can monitor power and thermal data for their assets in the datacenter, and Intel DCM provides power and thermal control policies allowing IT to better manage available power capacity and optimize productivity by deterministically managing power at the server, rack, row and data center levels.

I/O Innovation and Network Capabilities

With the unprecedented growth in data traffic, it is essential that systems not only improve computational abilities, but also enable data to flow faster to support data-hungry applications and increase the bandwidth within the data center.

- **Intel® Integrated I/O (Intel® IIO):** Intel IIO moves the I/O controller from a separate chip on the motherboard directly onto the processor die while also supporting the latest generation PCI Express* 3.0 standard and Intel® Data Direct I/O. This can reduce I/O latency up to 30 percent over previous architectures^{1,6} and supports the PCIe* 3.0 specification which improves I/O bandwidth by up to 2x^{1,7}.
- **Intel® Data Direct I/O (Intel® DDIO):** This technology allows Intel® Ethernet controllers and other adapters to route I/O traffic directly to the processor cache. This process reduces trips to system memory to further lower power use and I/O latency.

Trusted Security

The Intel® Xeon® processor E5-2600 product family reaffirms Intel's commitment to providing a secure hardware foundation for today's data centers.

- **Intel® Advanced Encryption Standard – New Instructions (Intel® AES-NI⁸):** These microprocessor instructions can dramatically reduce the processing overhead associated with encryption/decryption so IT can broadly encrypt all business critical data on their devices and over the network. Where AES is used, Intel AES-NI can make it faster and stronger. AES can be used to protect data during transmission and storage, and to protect data in enterprise applications.
- **Intel® Trusted Execution Technology (Intel® TXT⁹):** Intel TXT is a technology for establishing more trusted platforms. It uses processor, chipset and BIOS enhancements to measure the components of a launch environment to enforce that only “known good” configurations are launched and allow these configurations to be reported. This helps protect against a number of software-based attacks and enhances the ability to meet audit and compliance activities with greater visibility and control for virtualized and cloud environments.

Intel has seen strong growth in the software ecosystem support for these security technologies with Intel AES-NI being used by Microsoft*, Red Hat*, McAfee*, and Oracle*, and Intel TXT by VMware* and Xen* and others.

Feature Summary Table

Feature	Intel® Xeon® Processor E5-2600 Product Families	Intel® Xeon® Processor 5600 Series
Intel® QPI Ports	2	2
Intel® QPI Speed (GT/s)	6.4, 7.2, 8.0	4.8, 5.6, 6.4
Cores	4, 6 or 8	4 or 6
Threads Per Socket	Up to 16 Threads	Up to 12 Threads
Last-level Cache (LLC)	Up to 20 MB	Up to 12MB
Maximum Base Frequency	3.3 GHz	3.60 GHz
Maximum Turbo Frequency	3.8 GHz	3.86 GHz
Memory Channels	4	3
Max DIMM/ 2S System	24 DIMMs	18 DIMMs
Memory Speed (1.5V)	up to 1600 MHz	up to 1333 MHz
Memory Speed (1.35V)	up to 1333 MHz	up to 1333 MHz
Max Memory Capacity	768 GB	288 GB
PCIe* Lanes / processor or IOH	40	36
PCIe* Speed (GT/s)	PCIe 3.0 at 8 GT/s	PCIe 2.0 at 5.6 GT/s
TDP (W)	150 (Workstation only), 135, 130,115 95, 80, 70, 60W	130, 95, 80, 60, 40W

Pricing and Specification Table

SKU	Cores	Frequency	Cache	Price
E5-2690	8	2.90	20M	\$2057
E5-2687W	8	3.10	20M	\$1885
E5-2680	8	2.70	20M	\$1723
E5-2670	8	2.60	20M	\$1552
E5-2667	6	2.90	15M	\$1552
E5-2665	8	2.40	20M	\$1440
E5-2660	8	2.20	20M	\$1329
E5-2650	8	2.00	20M	\$1107
E5-2650L	8	1.80	20M	\$1107
E5-2643	4	3.30	10M	\$885
E5-2640	6	2.50	15M	\$885
E5-2637	2	3.00	5M	\$885
E5-2630	6	2.30	15M	\$612
E5-2630L	6	2.00	15M	\$662
E5-2620	6	2.00	15M	\$406
E5-2609	4	2.40	10M	\$294

E5-2603	4	1.80	10M	\$198
E5-1660	6	3.30	15M	\$1080
E5-1650	6	3.20	12M	\$583
E5-1620	4	3.60	10M	\$294

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1 Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to <http://www.intel.com/performance>

2 (Generational Performance) Source: Performance comparison using best submitted/published 2-socket server results on the SPECfp*_rate_base2006 benchmark as of 6 March 2012. Baseline score of 271 published by Itautec on the Servidor Itautec MX203* and Servidor Itautec MX223* platforms based on the prior generation Intel® Xeon® processor X5690. New score of 492 submitted for publication by Dell on the PowerEdge T620 platform and Fujitsu on the PRIMERGY RX300 S7* platform based on the Intel® Xeon® processor E5-2690. For additional details, please visit <http://www.spec.org>. Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase.

3 (Energy Efficient Performance) Source: Performance comparison using best submitted/published 2-socket single-node server results on the SPECpower_ssj*2008 benchmark as of 6 March 2012. Baseline score of 3,329 ssj*_ops/watt published by Hewlett-Packard on the ProLiant DL360 G7* platform based on the prior generation Intel® Xeon® processor X5675. Score of 5,093 ssj*_ops/watt submitted for publication by Fujitsu on the PRIMERGY RX300 S7* platform based on the Intel® Xeon® processor E5-2660. For additional details, please visit <http://www.spec.org/>. Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase.

4 (AVX) Source: Performance comparison using Linpack benchmark. Baseline score of 159.4 based on Intel internal measurements as of 5 December 2011 using a Supermicro* X8DTN+ system with two Intel® Xeon® processor X5690, Turbo Enabled, EIST Enabled, Hyper-Threading Enabled, 48 GB RAM, Red Hat* Enterprise Linux Server 6.1. New score of 347.7 based on Intel internal measurements as of 5 December 2011 using an Intel® Rose City platform with two Intel® Xeon® processor E5-2690, Turbo Enabled or Disabled, EIST Enabled, Hyper-Threading Enabled, 64 GB RAM, Red Hat* Enterprise Linux Server 6.1.

5 (Turbo) Requires a system with Intel® Turbo Boost Technology. Intel Turbo Boost Technology and Intel Turbo Boost Technology 2.0 are only available on select Intel® processors. Consult your PC manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit <http://www.intel.com/go/turbo>

6 (I/O Latency) Source: Intel internal measurements of average time for an I/O device read to local system memory under idle conditions comparing the Intel® Xeon® processor E5-2600 product family (230 ns) vs. the Intel® Xeon® processor 5500 series (340 ns). Baseline Configuration: Green City system with two Intel® Xeon® processor E5520 (2.26GHz, 4C), 12GB memory @ 1333, C-States Disabled, Turbo Disabled, SMT Disabled. New Configuration: Meridian system with two Intel® Xeon® processor E5-2665 (2.4GHz, 8C), 32GB memory @ 1600 MHz, C-States Enabled, Turbo Enabled. The measurements were taken with a LeCroy* PCIe* protocol analyzer using Intel internal Rubicon (PCIe* 2.0) and Florin (PCIe* 3.0) test cards running under Windows* 2008 R2 w/SP1.

7 (PCIe* 3.0) Source: 8 GT/s and 128b/130b encoding in PCIe* 3.0 specification enables double the interconnect bandwidth over the PCIe* 2.0 specification. Source: http://www.pcisig.com/news_room/November_18_2010_Press_Release/

8 (ASE-NI) Intel® AES-NI requires a computer system with an AES-NI enabled processor, as well as non-Intel software to execute the instructions in the correct sequence. AES-NI is available on select Intel® processors. For availability, consult your reseller or system manufacturer. For more information, see <http://software.intel.com/en-us/articles/intel-advanced-encryption-standard-instructions-aes-ni/>

9 (TXT) No computer system can provide absolute security under all conditions. Intel® Trusted Execution Technology (Intel® TXT) requires a computer with Intel® Virtualization Technology, an Intel TXT-enabled processor, chipset, BIOS, Authenticated

Code Modules and an Intel TXT-compatible measured launched environment (MLE). Intel TXT also requires the system to contain a TPM v1.s. For more information, visit <http://www.intel.com/technology/security>