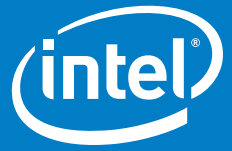


Product Brief

Intel® Xeon® Processor E5-2600 v3
Product Family



The Heart of an Agile Data Center

Intel® Xeon® Processor E5-2600 v3¹ Product Family

The new Intel® Xeon® processor E5-2600 v3 family product helps IT address the growing demands placed on infrastructure, from supporting business growth to enabling new services faster, delivering new applications in the enterprise, technical computing, communications, storage, and cloud. This new generation of processors enables powerful, agile data centers by supporting a Software-Defined Infrastructure (SDI) to address the imminent need of greater flexibility with higher levels of automation and orchestration. In addition, the Intel Xeon Processor E5-2600 v3 product family delivers significant benefits in performance, power efficiency, virtualization, and security. Combining these benefits with a low total cost of ownership and Intel's acclaimed product quality, the Intel Xeon Processor E5-2600 v3 product family is a compelling solution for any organization.



Versatile Performance with Improvements up to 2.2X²

The Intel Xeon Processor E5-2600 v3 product family adds 50 percent more cores and cache³ over the previous generation and includes numerous other hardware enhancements, such as Intel® Advanced Vector Extensions 2 (Intel® AVX2) and Intel® Quick Path Interconnect link (QPI). These innovations deliver up to 2.2X the performance over the previous-generation to significantly boost output across a broad set of workloads. The Intel Xeon Processor E5-2600 v3 product family also delivers an increase in virtualization density of up to 1.6X compared to the previous generation,⁴ building on an ever more important capability in the data center.

- **Higher performance for diverse workloads** – With up to 18 cores per socket, 45 MB of last-level cache (LLC), and next generation DDR4 memory support, the Intel Xeon Processor E5-2600 v3 product family delivers significant performance improvements in workloads across all industries, from small businesses to large corporations in enterprise and technical computing, communications, storage, and private clouds.

- **Up to 1.9X higher performance gains⁵ for enterprise workloads with Intel® AVX2** – Intel AVX2 with new Fused Multiply-Add (FMA) instructions in Intel Xeon Processor E5-2600 v3 product family doubles the floating point operations (Flops) from first generation Intel AVX, and doubles the width of vector integer instructions to 256 bits, expanding the benefits of Intel AVX2 into enterprise computing.

- **Hardware-accelerated nested virtualization** – Intel® Virtual Machine Control Structure (Intel® VMCS Shadowing) extends root virtual machine monitor (VMM)-like privileges to a guest VMM, enabling legacy OS, applications, security software, and other code not supported on the platform root VMM to be run on the system ([see example](#))⁶

- **Per-core P States** – New per-core P states (PCPS) dynamically adapt and improve power for each core, resulting in optimized workload processing.

Foundation for Trust and Security⁷

Data protection and data center security is critical to all organizations. Intel's hardware-enhanced security technologies on the Intel Xeon Processor E5-2600 v3 product family better protect data and platforms through workload isolation, security policy enforcement, and faster data encryption.

- **Up to 2X faster encryption and decryption⁸** – Intel® Data Protection Technology with Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI) accelerates data encryption and decryption up to 2X faster than previous-generation Intel Xeon Processor E5 family. With many workloads, Intel AES-NI encryption and decryption is practically transparent to system resources. Combined with Intel Data Protection technology with Intel® Secure Key random number generation, Intel Xeon Processor E5 v3 family provides even stronger data protection.
- **Strong protection against platform attacks** – Intel® Platform Protection Technology with Intel® OS Guard and BIOS Guard traps external calls trying to hijack System Management Mode (SMM) code in the OS, and provides workstation BIOS protection during FLASH updates via protected agent authentication.
- **Intel® Platform Protection Technology** – with Intel® Trusted Execution Technology (Intel® TXT) helps protect platform firmware and the OS kernel from pre-boot attacks. TXT now supports Trusted Platform Module 2.0 (TPM 2.0) with stronger cryptographic capabilities.

Innovation that Streamlines the Data Center

With the growth of private and hybrid clouds in the enterprise and with increasing demand for services, IT seeks higher efficiencies in orchestration, data center management, and virtualization on a path toward a Software-Defined Infrastructure (SDI). The Intel Xeon Processor E5-2600 v3 family brings several innovations, such as Intel® Node Manager 3.0 to help IT deliver greater levels of efficiency, while responding faster to business needs. Other key innovations that will have significant impact on streamlining data centers and extending efficiency and performance include DDR4 and Intel® Ethernet Controller XL710 Series.

- **Up to 1.4X higher memory bandwidth⁹** – DDR4 next-generation memory technology improves platform performance on memory intensive workloads with up to 1.4X higher bandwidth versus previous-generation platforms. Adopting DDR4 enables solutions to meet data center energy efficiency requirements.
- **Enhanced data center orchestration and platform telemetry** – Intel Node Manager 3.0 can provide real-time telemetry data on server power, thermal, and utilization.

IT may utilize this data to implement policies that can help improve data center efficiency and power utilization, which are key components of orchestration and a highly efficient data center.

- **Infrastructure utilization** – Cache monitoring allows real-time, high-confidence measurements of LLC usage, providing control of workload placement and load balancing across shared infrastructure in the virtualized environment.
- **Low I/O latency** – Intel® Data Directed I/O enhancements allow targeting the LLC for I/O traffic and controlling the LLC way assignment to specific cores, without hitting the memory first. These result in high LLC performance and low I/O latency.

Intel® Xeon® Processor E5 v3 Product Family Overview

High Performance for the Broadest Range of Applications and Environments

Advanced multi-core, multi-threaded processing

- Up to 18 cores and 36 threads per socket

Larger cache and faster memory

- Up to 45 MB of LLC for fast access to frequently used data
- Up to 24 DIMMs per two-socket server to support multiple data-hungry VMs
- Faster maximum memory speeds than the previous generation (2133 MHz versus 1866 MHz)

Higher performance for diverse workloads

- Intel® Turbo Boost Technology¹⁰ takes advantage of power and thermal headroom to increase processor frequencies for diverse workloads

Higher performance for technical computing applications⁵

- Intel AVX2 accelerates floating point and integer computations with support for 256-bit vectors
- Provides up to 1.9X more peak floating point operations¹¹ than previous generation

Industry-leading I/O performance

- Intel Integrated I/O provides up to 80 PCIe* lanes per two-socket server, and supports the PCIe 3.0 specification with atomic operations support for improved peer-to-peer (P2P) bandwidth
- The Non-Volatile Memory Express* (NVMe*) specification that is supported by the Intel® Solid-State Drive Data Center Family for PCIe overcomes SAS and SATA SSD performance limitations through an optimized register interface, command set, and feature set for PCI Express (PCIe*)-based Solid-State Drives (SSDs). For more information please visit [NVMeExpress](#)¹²

Integrated storage features

- Supports key storage processor features, including x16 non-transparent bridging (vs. x8 NTB), to increase scalability and accelerated RAID for implementing RAID 5 and 6 without a custom ASIC

Strong, fast data encryption

Intel Data Protection Technology with:

- Intel® Secure Key provides high-quality security keys
- AES-NI enables encryption to be implemented pervasively without sacrificing application response times
- Intel AVX2 instructions deliver great performance of compute-intensive cryptographic algorithms and efficiency in large integer arithmetic operations, such as the Secure Hash Algorithm (SHA)

An excellent foundation for secure multi-tenancy

Intel® Platform Protection Technology with:

- Trusted Execution Technology enables IT to establish trusted pools of virtualized resources for stronger security and compliance in multi-tenant virtual and cloud environments
- OS Guard protects against escalation of privilege attacks that attempt to gain control of the platform or execute malware

Industry-leading energy-efficiency

- Intel 22 nm, 3-D tri-gate transistors cut power consumption by half, versus the prior manufacturing process¹³
- Intel® Intelligent Power technology¹⁴ dynamically manages CPU and memory energy states to minimize power without slowing performance
- Per-core P states dynamically and independently regulate power in each core, resulting in energy efficient processing

Comprehensive monitoring and control

- Intel Node Manager lets IT monitor server power, thermals, and utilization, and set power limits
- Intel® Data Center Manager: Energy Director lets IT dynamically optimize energy consumption at every level, from individual servers, racks, and rows to entire data centers

Data Center Extended Ingredients

With increasing demands on IT to support a broader range of workloads and address emerging constraints in the data center, Intel continues to develop products that focus on providing greater performance and flexibility in the infrastructure. These data center ingredients include the following:

- **Intel® Xeon Phi™ Coprocessor** – Based on Intel® Many Integrated Core (Intel® MIC) architecture, the Intel Xeon Phi coprocessor delivers leading performance for highly parallel workloads.
- **The Intel® Ethernet Controller XL710 Series** – Delivers proven 10 and 40 Gigabit Ethernet connectivity for the platform, extending Intel® Virtualization technologies beyond server virtualization to network virtualization.
- **Intel® Solid-State Drive Data Center Family for PCIe*** – Built on the NVMe* specification, the comprehensive product family of 2.5-inch and Add-In-Card form-factors delivers breakthrough performance, optimized for real-world applications. For more information please visit [Intel® SSD](#).¹⁵
- **Storage Related Software** – Intel® Cache Acceleration Software (Intel® CAS) is server software that caches the most active data on SSDs, providing application acceleration at low cost. Intel® Rapid Storage Technology Enterprise (Intel® RSTe) is software that provides easy-to-use, enterprise-class data protection.
- **Intel® Communication Chipset Series 8900** – Highlights Intel® QuickAssist Technology and delivers hardware, encryption, compression, and acceleration for networking and storage workloads. Please see the [adapter brief](#).¹⁶
- **Intel Data Center Software** – Intel Data Center Manager (Intel® DCM) and other Intel software give IT a broad set of [data center tools](#)¹⁷ to help stay competitive and take advantage of Intel hardware.

Intel® Xeon® Processor E5-2600 v3
Product Family

PROCESSOR NUMBER	CPU FREQUENCY (GHz)	INTEL® TURBO BOOST 2.0 TECHNOLOGY ^a	INTEL® HT TECHNOLOGY	LLC CACHE (MB)	NUMBER OF CORES	POWER (W)	INTEL® QPI LINK SPEED (GT/s)	DDR4 MEMORY
FOR 2-SOCKET SERVERS								
Intel® Xeon® Processor E5-2699 v3	2.3	*	*	45	18	145	9.6	2133
Intel® Xeon® Processor E5-2698 v3	2.3	*	*	40	16	135	9.6	2133
Intel® Xeon® Processor E5-2697 v3	2.6	*	*	35	14	145	9.6	2133
Intel® Xeon® Processor E5-2695 v3	2.3	*	*	35	14	120	9.6	2133
Intel® Xeon® Processor E5-2690 v3	2.6	*	*	30	12	135	9.6	2133
Intel® Xeon® Processor E5-2683 v3	2.0	*	*	35	14	120	9.6	2133
Intel® Xeon® Processor E5-2680 v3	2.5	*	*	30	12	120	9.6	2133
Intel® Xeon® Processor E5-2670 v3	2.3	*	*	30	12	120	9.6	2133
Intel® Xeon® Processor E5-2660 v3	2.6	*	*	25	10	105	9.6	2133
Intel® Xeon® Processor E5-2650 v3	2.3	*	*	25	10	105	9.6	2133
Intel® Xeon® Processor E5-2640 v3	2.6	*	*	20	8	90	8.0	1866
Intel® Xeon® Processor E5-2630 v3	2.4	*	*	20	8	85	8.0	1866
Intel® Xeon® Processor E5-2620 v3	2.4	*	*	15	6	85	8.0	1866
Intel® Xeon® Processor E5-2609 v3	1.9	—	—	15	6	85	6.4	1600
Intel® Xeon® Processor E5-2603 v3	1.6	—	—	15	6	85	6.4	1600
FOR 2-SOCKET SERVERS – (FREQUENCY OPTIMIZED)								
Intel® Xeon® Processor E5-2667 v3	3.2	*	*	20	8	135	9.6	2133
Intel® Xeon® Processor E5-2643 v3	3.4	*	*	20	6	135	9.6	2133
Intel® Xeon® Processor E5-2637 v3	3.5	*	*	15	4	135	9.6	2133
Intel® Xeon® Processor E5-2623 v3	3.0	*	*	10	4	105	8.0	1866
FOR 2-SOCKET SERVERS – LOW POWER								
Intel® Xeon® Processor E5-2650L v3	1.8	*	*	30	12	65	9.6	2133
Intel® Xeon® Processor E5-2630L v3	1.8	*	*	20	8	55	8.0	1866
FOR 2-SOCKET WORKSTATION								
Intel® Xeon® Processor E5-2687W v3	3.1	*	*	25	10	160	9.6	2133
FOR 1-SOCKET WORKSTATIONS								
Intel® Xeon® Processor E5-1680 v3	3.2	*	*	20	8	140	N/A	2133
Intel® Xeon® Processor E5-1660 v3	3.0	*	*	20	8	140	N/A	2133
Intel® Xeon® Processor E5-1650 v3	3.5	*	*	15	6	140	N/A	2133
Intel® Xeon® Processor E5-1630 v3	3.7	*	*	10	4	140	N/A	2133
Intel® Xeon® Processor E5-1620 v3	3.5	*	*	10	4	140	N/A	2133
FOR STORAGE AND COMMUNICATIONS								
Intel® Xeon® Processor E5-2658 v3	2.2	*	*	30	12	105	9.6	2133
Intel® Xeon® Processor E5-2648L v3	1.8	*	*	30	12	75	9.6	2133
Intel® Xeon® Processor E5-2628L v3	2.0	*	*	25	10	75	8.0	1866
Intel® Xeon® Processor E5-2618L v3	2.3	*	*	20	8	75	8.0	1866
Intel® Xeon® Processor E5-2608L v3	2.0	—	*	15	6	52	6.4	1866

* supported

— not supported

LEARN MORE about the [Intel Xeon Processor E5-2600 v3 product family](#).¹⁸

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>.

¹ Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See <http://www.intel.com/performance> for details.

² Source as of August 2014. Baseline configuration: Cisco Systems* UCS C240 M3 with two Intel® Xeon® Processor E5-2697 v2, Java* Standard Edition 7 Update 45, [source](#). Score: 63,079 SPECjbb*2013-MultiJVM max-jOPS, 23,797 SPECjbb*2013-MultiJVM critical-jOPS. New configuration: Intel® Server Board S2600WTT with two Intel® Xeon® Processor E5-2699 v3, Java* Standard Edition 8 Update 5, [source](#). Score: 139,511 SPECjbb*2013-MultiJVM max-jOPS, 43,107 SPECjbb*2013-MultiJVM critical-jOPS

³ Intel® Xeon® Processor E5-2699 v3 (18C, 45M Cache) compared to Intel® Xeon® Processor E5-2697 v2 (12C, 30M Cache).

⁴ Relative performance is calculated by assigning a baseline value of 1.0 to one benchmark result, and then dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms, and assigning them a relative performance number that correlates with the performance improvements reported. Baseline Configuration and relative performance on Server Virtualization Benchmark: Intel® Server Board S2600CP with two Intel® Xeon® Processor E5-2697 v2, 16x32GB DDR3-1600 QR LR-DIMM, VMWare ESXi* 5.5 GA, relative performance: 1.0. New configuration: Intel® Server Board S2600GZ with two Intel® Xeon® Processor E5-2699 v3, 16x32GB DDR4-2133 QR LR-DIMM, VMWare ESXi* 5.5 GA, relative performance: 1.6. Source: Intel internal measurements TR#1411 as of August 2014.

⁵ Source as of August 2014 TR#3034 on Linpack*. Baseline configuration: Intel® Server Board S2600CP with two Intel® Xeon® Processor E5-2697 v2, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, 8x8GB DDR3-1866, RHEL* 6.3, Intel® MKL 11.0.5, score: 528 GFlops. New configuration: Intel® Server System R2208WTTYS with two Intel® Xeon® Processor E5-2699 v3, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, 8x16GB DDR4-2133, RHEL* 6.4, Intel® MKL 11.1.1, score: 1,012 GFlops

⁶ See Intel VMCS Shadowing example at <http://www.intel.com/content/www/us/en/it-management/intel-it-best-practices/intel-vmcs-shadowing-paper.html?wapkw=vmcs+shadowing>.

⁷ No computer system can provide absolute security. Requires an enabled Intel® processor and software optimized for use of the technology. Consult your system manufacturer and/or software vendor for more information.

⁸ Source as of June 2014 on AES-128-GCM Encryption algorithm: Intel internal measurements using Intel® Server Board S2600CW2S with two Intel® Xeon® Processor E5-2658 v3, DDR4-2133, CentOS v3.8.4, Open SSL v1.0.2-beta1. Baseline Configuration: Intel internal measurements with two E5-2658 v2, DDR3-1866, CentOS v3.8.4, Open SSL v1.0.2-beta1.

⁹ Source as of August 2014 TR#3044 on STREAM (triad): Intel® Server Board S2600CP with two Intel® Xeon® Processor E5-2697 v2, 24x16GB DDR3-1866 @1066MHz DR-RDIMM, score: 58.9 GB/sec. New Configuration: Intel® Server System R2208WTTYS with two Intel® Xeon® Processor E5-2699 v3, 24x16GB DR4-2133 @ 1600MHz DR-RDIMM, score: 85.2 GB/sec.

¹⁰ 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>

¹¹ Source as of August 2014 TR#3034 on Linpack*. Baseline configuration: Intel® Server Board S2600CP with two Intel® Xeon® Processor E5-2697 v2, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, 8x8GB DDR3-1866, RHEL* 6.3, Intel® MKL 11.0.5, score: 528 GFlops. New configuration: Intel® Server System R2208WTTYS with two Intel® Xeon® Processor E5-2699 v3, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, 8x16GB DDR4-2133, RHEL* 6.4, Intel® MKL 11.1.1, score: 1,012 GFlops

¹² Go to <http://www.nvmeexpress.org> for details.

¹³ Compared to previous generation 2-D transistors on 32nm planar transistors. Source: Intel internal testing

¹⁴ Intel® Intelligent Power Technology requires a computer system with an enabled Intel® processor, chipset, BIOS and for some features, an operating system enabled for it. Functionality or other benefits may vary depending on hardware implementation and may require a BIOS and/or operating system update. Please check with your system vendor for details.

¹⁵ See <https://www.ssd.intel.com/content/www/us/en/solid-state-drives/intel-ssd-dc-family-for-pcie.html>

¹⁶ See <http://www.intel.com/content/www/us/en/network-adapters/quickassist-adapter-8950-brief.html>

¹⁷ Please visit www.intel.com/DatacenterSoftware or <https://software.intel.com> to learn more.

¹⁸ See www.intel.com/products/server/processor/xeonE5/index.htm.

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Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.

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