

PLATFORM BRIEF

Intel® Xeon® Processor E5-2400 Series
and Intel® C604 or Intel® C602-J Chipset
Intelligent Systems



Intel® Xeon® Processor E5-2400 Series-based Platforms for Intelligent Systems

Ideal for Intelligent Systems—context-aware, securely managed embedded and communications devices that connect seamlessly to networks, clouds and each other.



Product Overview

Based on the latest generation Intel® micro-architecture (codenamed Sandy Bridge), the Intel® Xeon® processor E5-2400 series provides the performance, I/O and memory capabilities for a wide range of compute-intensive embedded and communications applications including communication infrastructure servers, blades and appliances; security servers, blades and appliances; carrier-grade rack-mount servers; proprietary form factors, such as router modules; AdvancedTCA*-based blades; and medical servers, blades and appliances.

Platform options include four-, six- and eight-core single-socket solutions, and up to 16-core dual-socket solutions, providing significant performance improvement over previous-generation Intel® Xeon® processors. For example, the 1.8 GHz eight-core Intel® Xeon® processor E5-2448L¹ at 70W thermal design power (TDP) delivers nearly 44 percent performance gain over the previous-generation 2.4 GHz six-core Intel® Xeon® processor E5645² at 80W TDP.¹ Increased memory capacity is provided with three memory channels per processor and up to 1600 MHz DDR3 memory.

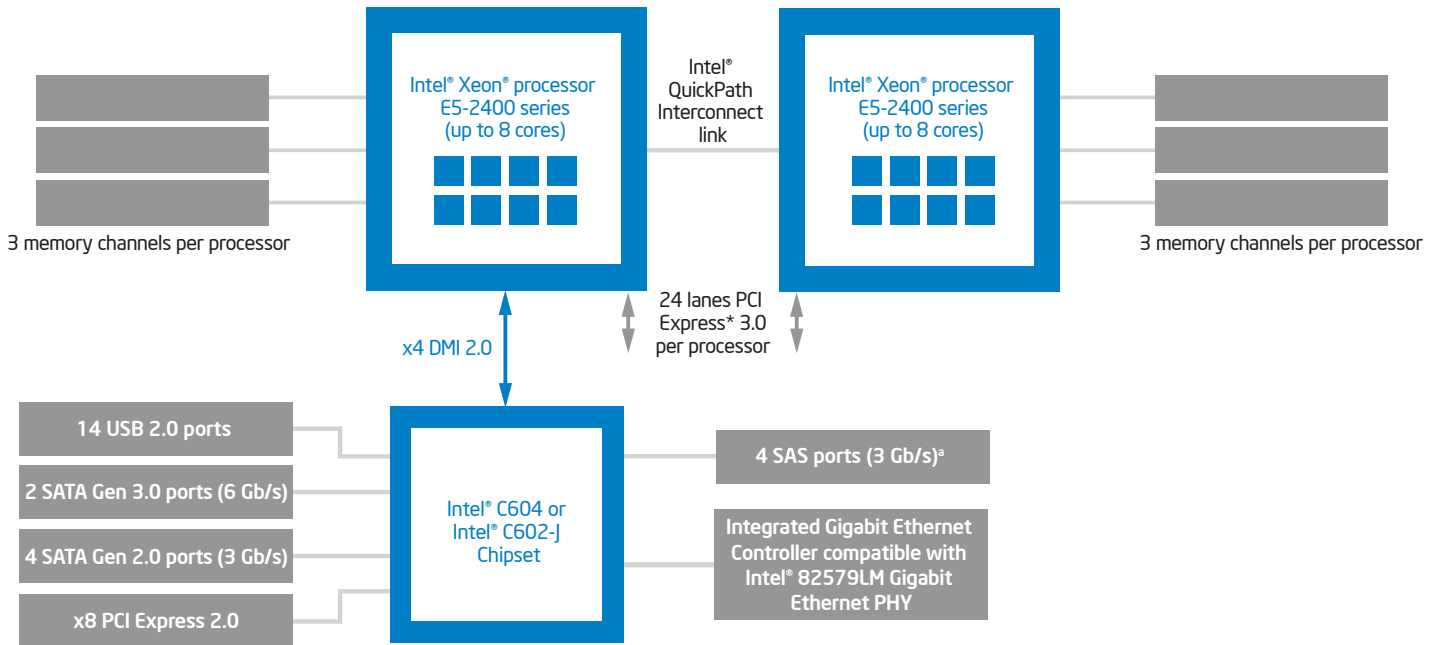
32nm process technology supports performance/watt-optimized designs. Three of the processors in this series feature robust thermal profiles for thermally constrained applications such as the Advanced-TCA form factor and applications complying with NEBS Level 3 thermal specifications.

Developers can create a single design, then deliver a family of products due to a broad range of processor features, including eight-core (16 threads), six-core (12 threads) and four-core (8 threads) options, and a TDP range of 50W to 95W. Single- or dual-socket configurations, when paired with the Intel® C604 or Intel® C602-J chipset (see Figure 1), maintain compatibility with enterprise platform requirements.

This server-class Intel® processor series includes PCI Express* 3.0² integrated on the processor die to boost performance, reduce latency and save power. This saves board real estate over previous-generation three-chip platforms by eliminating the need for a separate I/O hub.

Intel® Advanced Vector Extensions accelerates compute performance for signal and image processing applications. The newest release of Intel® AES New Instructions³ provides robust encryption without increasing overhead, while improving performance in AES-based communications cryptographic workloads.

All processors feature Intel® Virtualization Technology⁴ for flexible virtualization, and an Intel® QuickPath Interconnect (Intel® QPI) link which maximizes interprocessor transfer rates. Intel® Turbo Boost Technology⁵ and Intel® Hyper-Threading Technology⁶ deliver top performance for bandwidth-intensive applications.



^aIntegrated SAS ports not included in C602-J chipset.

Figure 1. Dual-socket (shown) or single-socket configurations of Intel® Xeon® processor E5-2400 series-based platforms are ideal for compute-intensive or thermally constrained embedded and communications applications.

Software Overview

The following independent operating system and BIOS vendors provide support for this platform.

OPERATING SYSTEM

Microsoft Windows Server* 2008 R2 Enterprise (x64)
 Microsoft Windows Server 2008 Enterprise (x32 and x64)
 Red Hat Enterprise Linux* Server (x32 and x64)
 SUSE Linux* Enterprise Server (x32 and x64)
 Wind River Linux* 4.2

CONTACT

Intel provides drivers⁷
 Intel provides drivers⁷
 Red Hat
 Novell
 Wind River

BIOS

American Megatrends
 Insyde Software
 Phoenix Technologies

Platform Features and Benefits

| FEATURES | BENEFITS |
|--|---|
| Supports key embedded platform requirements | <ul style="list-style-type: none"> ▪ Ideal for compute-intensive embedded applications. |
| Compatibility with Intel® enterprise server solutions | <ul style="list-style-type: none"> ▪ Potential to maximize design reuse between enterprise and embedded solutions. |
| Extended life cycle product support | <ul style="list-style-type: none"> ▪ Protects system investment by enabling extended product availability for embedded, communications and storage customers. |
| Low-power and robust thermal profile processor options ^A (E5-2448L, E5-2428L, E5-2418L) | <ul style="list-style-type: none"> ▪ Ideal for NEBS Level 3 ambient operating temperature specifications. ▪ Ideal for smaller form factors with thermal constraints (blades), especially solutions requiring compliance with AdvancedTCA* form factor specifications (PICMG 3.0). |
| Embedded ecosystem support | <ul style="list-style-type: none"> ▪ Along with a strong ecosystem of hardware and software vendors, including members of the Intel® Embedded Alliance (intel.com/go/eca), Intel helps to cost-effectively meet development challenges and speed time-to-market. |
| Intelligent Performance | <ul style="list-style-type: none"> ▪ Delivers optimum efficiency by adapting performance to embedded application needs. |
| Integrated PCI Express* 3.0 on processor die | <ul style="list-style-type: none"> ▪ Up to 24 lanes of PCI Express 3.0 per socket. |
| Large memory capacity | <ul style="list-style-type: none"> ▪ Up to three (3) memory channels with maximum of two (2) DIMMS per channel. |
| Large L3 cache | <ul style="list-style-type: none"> ▪ 2.5 MB core boosts performance while reducing traffic to the processor cores. |
| Intel® Turbo Boost Technology ⁵ | <ul style="list-style-type: none"> ▪ Boosts performance for specific workloads by increasing processor frequency. |
| Intel® QuickPath Interconnect | <ul style="list-style-type: none"> ▪ Supports Intel® Xeon® processor E5-2400 series up to 8.0 GT/s⁸ to enable high-performance dual-socket designs. |
| Intel® Hyper-Threading Technology ⁶ | <ul style="list-style-type: none"> ▪ Boosts performance for parallel, multi-threaded applications. |
| Intel® Advanced Vector Instructions | <ul style="list-style-type: none"> ▪ Accelerates compute performance for signal and image processing applications. |
| Intel® AES New Instructions ³ | <ul style="list-style-type: none"> ▪ Newest release provides faster, more efficient cryptographic performance. |
| Intel® Trusted Execution Technology ⁹ | <ul style="list-style-type: none"> ▪ Delivers a more secure boot and launch environment. |
| Automated Energy Efficiency | <ul style="list-style-type: none"> ▪ Reduces idle power consumption. |
| Integrated power gates | <ul style="list-style-type: none"> ▪ Allows idling cores to be reduced to near-zero power independent of other cores. |
| Automated low-power states | <ul style="list-style-type: none"> ▪ Puts processor, memory and I/O controller into the lowest available power states that will meet the requirements of the current workload. |
| Flexible Virtualization | <ul style="list-style-type: none"> ▪ Enhances virtualization performance. |
| Intel® Virtualization Technology ⁴ | <ul style="list-style-type: none"> ▪ Hardware assists boost virtualization performance by allowing OS more direct access to the hardware. ▪ Intel® Virtualization Technology (Intel® VT) FlexMigration enables seamless migration of running applications among current and future Intel® processor-based servers. ▪ Intel® VT FlexPriority improves virtualization performance by allowing guest operating systems to read and change task priorities without virtual machine monitor (VMM) intervention. ▪ Extended Page Tables provide better performance by reducing the overhead caused by page table utilization of virtual machines. |

Intel® Xeon® Processor E5-2400 Series for Intelligent Systems

| PRODUCT NAME ^A | INTEL® XEON® PROCESSOR E5-2448L | INTEL® XEON® PROCESSOR E5-2430 | INTEL® XEON® PROCESSOR E5-2428L | INTEL® XEON® PROCESSOR E5-2418L |
|---|------------------------------------|-----------------------------------|------------------------------------|------------------------------------|
| Cores | 8 | 6 | 6 | 4 |
| CPU Core Frequency | 1.8 GHz | 2.2 GHz | 1.8 GHz | 2.0 GHz |
| L3 Cache | 20 MB | 15 MB | 15 MB | 10 MB |
| Thermal Design Power | 70 W | 95 W | 60 W | 50 W |
| Robust Thermal Profile (High Tcase) | 93.2° C ¹⁰ | Standard | 88.4° C ¹⁰ | 92.4° C ¹⁰ |
| DDR3 Memory | 1600 MHz | 1333 MHz | 1333 MHz | 1333 MHz |
| DDR3 Memory Channels | 3 | 3 | 3 | 3 |
| PCI Express* 3.0 Lanes | 24 | 24 | 24 | 24 |
| Intel® Turbo Boost Technology ⁵ | Yes | Yes | Yes | Yes |
| Intel® Hyper-Threading Technology ⁶ | Yes | Yes | Yes | Yes |
| Intel® QuickPath Interconnect Link Speed ⁸ | 8.0 GT/s | 7.2 GT/s | 7.2 GT/s | 6.4 GT/s |
| Intel® QuickPath Interconnect Links | 1 | 1 | 1 | 1 |
| Package | LGA 1356 | LGA 1356 | LGA 1356 | LGA 1356 |

Intel® C604 and C602-J Chipsets for Intelligent Systems

- Four integrated SAS ports (3 Gb/s) [C604 SKU only]
- Four SATA Gen 2.0 ports (3 Gb/s)
- Two SATA Gen 3.0 ports (6 Gb/s)
- 14 USB 2.0 ports
- x8 PCI Express* 2.0
- Integrated Gigabit Ethernet Controller compatible with Intel® 82579LM Gigabit Ethernet PHY
- 5.4 W to 7.8 W TDP depending upon configuration

Intel in Embedded and Communications: intel.com/embedded

^A Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor series, not across different processor sequences. See http://www.intel.com/products/processor_number for details.

¹ Intel® Xeon® processor E5-2448L benchmarking results collected by Intel Corporation, March 2012. The Intel® Xeon® processor E5645 benchmarking results collected by Intel Corporation, June 2010.

Platform configurations:

– Intel® Xeon® processor E5-2448L (2 sockets) at 1.8 GHz, 20 MB L3 Cache, 70W; Intel® C604 chipset; 6 x 8 GB RDIMM DDR3-1333MHz

– Intel® Xeon® processor E5645 (2 sockets) at 2.4 GHz, 12 MB Last Level Cache, 80W; Intel® 5520 chipset, 12 x 4 GB RDIMM DDR3-1333 MHz

Software configurations:

– Intel® Xeon® processor E5-2448L: OS: Red Hat 6.1 Beta, kernel version 2.6.32-122.el6.x86_64; Compiler: Intel® C/C++ 12.1; Benchmark CPU2006 v1.1

– Intel® Xeon® processor E5645: OS: SUSE Linux Enterprise Server 10 SP3 64 bit; Compiler: Intel® C/C++ 11.1; Benchmark CPU2006 v1.1

² Certain exceptions and constraints apply.

³ 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/>

⁴ Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, and virtual machine monitor (VMM). Functionality, performance or other benefits will vary depending on hardware and software configurations. Software applications may not be compatible with all operating systems. Consult your PC manufacturer. For more information, visit <http://www.intel.com/go/virtualization>

⁵ 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 Available on select Intel® Core™ processors. Requires an Intel® HT Technology-enabled system. Consult your PC manufacturer. Performance will vary depending on the specific hardware and software used. For more information including details on which processors support HT Technology, visit <http://www.intel.com/info/hyperthreading>.

⁷ Drivers available at: downloadcenter.intel.com (enter chipset name).

⁸ GT/s = Gig Transfers/second.

⁹ No computer system can provide absolute security under all conditions. Intel® Trusted Execution Technology (Intel® TXT) requires a computer system with Intel® Virtualization Technology, an Intel TXT-enabled processor, chipset, BIOS, Authenticated Code Modules and an Intel TXT-compatible measured launched environment (MLE). The MLE could consist of a virtual machine monitor, an OS or an application. In addition, Intel TXT requires the system to contain a TPM v1.2, as defined by the Trusted Computing Group and specific software for some uses. For more information, see intel.com/technology/security

¹⁰ Not to exceed 360 hours per year.

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