Intel® Xeon® 5500 Platform for Embedded Computing

Ideal for Single- or Dual-Socket Embedded, Communications, and Storage Applications

Product Overview

The Intel® Xeon® processor 5500 series, based on the latest-generation Intel® microarchitecture codenamed Nehalem, represents the next step in energy efficiency, performance and virtualization with an integrated memory controller. The platform provides key embedded features such as extended life cycle support and options for thermally constrained applications, while maintaining compatibility with enterprise platform configurations. Based on 45nm process technology, processors can deliver up to 1.5x more performance within the same thermal design power (TDP) over the previous-generation Intel® Xeon® processor 5400 series for embedded computing.[1]

Processors are available in quad-core and dual-core options with TDP ranging from 80W to as low as 38W. Two processor options provide robust thermal profiles, ideal for the AdvancedTCA* form factor and compliance with NEBS Level 3 thermal specifications. Processors can be used in single or dual-socket configurations with the Intel® 5520 chipset (see Figures 1 and 2). All Intel Xeon processors based on this new Intel microarchitecture have a common electrical and mechanical socket providing a simplified path to future upgrades.

The Intel Xeon processor 5500 series features new Intel® QuickPath Technology and Intel® Turbo Boost Technology[2] which, along with Intel® Hyper-Threading Technology,[3] deliver top performance for bandwidth-intensive applications. Also included is Intel® Virtualization Technology[4] for flexible virtualization.

The Intel 5520 chipset, consisting of the Intel® 5520 I/O Hub and Intel® I/O Controller Hub 10R, offers up to 42 lanes of PCI Express* (36 lanes PCI Express Gen 2), SATA ports and support for RAID.

This platform provides the performance, memory and I/O capabilities needed to meet a wide range of compute-intensive embedded, storage and communications applications such as:

- Communication infrastructure servers, blades and appliances
- Security servers, blades and appliances
- Storage servers, blades and appliances
- Carrier-grade rack-mount servers
- Proprietary, non-standard form factors, such as router modules
- AdvancedTCA-based blades
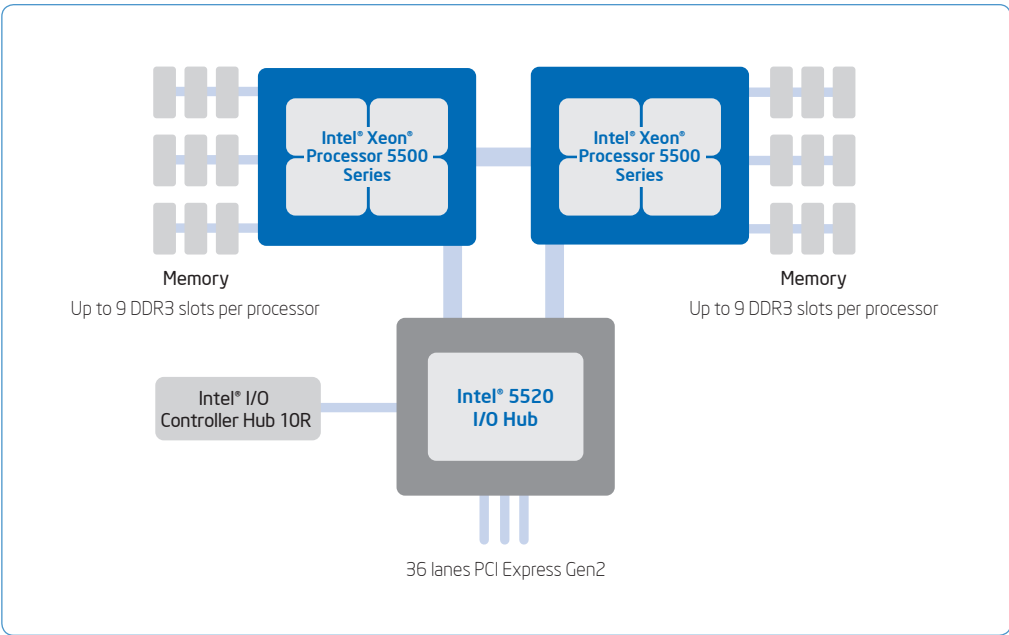- Medical servers, blades and appliances

**Figure 1. Dual-socket configuration of Intel® Xeon® 5500 platform
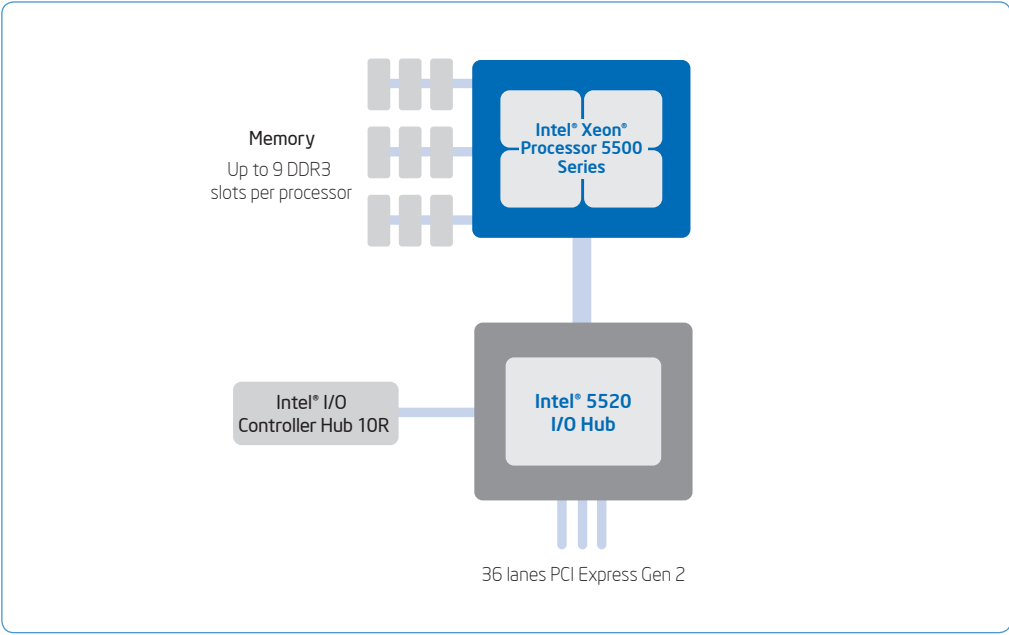is ideal for compute-intensive embedded applications**

**Figure 2: Single-socket configuration of Intel® Xeon® 5500 platform
is ideal for thermally constrained embedded applications**

Platform Features and Benefits

Features	Benefits
Supports Key Embedded Platform Requirements	▪ Ideal for compute-intensive embedded applications.
Compatibility with Intel® enterprise server solutions	▪ Potential to maximize design reuse between enterprise and embedded solutions.
Extended life cycle product support	▪ Protects system investment by enabling extended product availability for embedded customers.
Low-power and robust thermal profile processor options (L5508 at 38W TDP; L5518 at 60W TDP)	▪ Ideal for NEBS Level 3 ambient operating temperature specifications (thermal profile). ▪ Ideal for smaller form factors with thermal constraints (blades), especially solutions requiring compliance with AdvancedTCA* form factor specifications (PICMG 3.0).
Embedded ecosystem support	▪ Along with a strong ecosystem of hardware and software vendors, including members of the Intel® Embedded and Communications Alliance (intel.com/go/eca), Intel helps to cost-effectively meet development challenges and speed time-to-market.
Intelligent Performance	▪ Delivers up to 1.5x performance improvement within a power envelope similar to previous processors.[1]
Intel® Turbo Boost Technology[2]	▪ Boosts performance for specific workloads by increasing processor frequency.
Intel® QuickPath Technology	▪ Delivers bandwidth improvement for data-intensive applications.
Intel® Hyper-Threading Technology[3]	▪ Boosts performance for parallel, multi-threaded applications.
Large memory capacity	▪ Up to 144 GB of main memory supports higher performance for data-intensive applications.
Shared L3 cache	▪ Boosts performance while reducing traffic to the processor cores.
Automated Energy Efficiency	▪ Reduces idle power consumption.
Integrated power gates	▪ Allows idling cores to be reduced to near-zero power independent of other cores.
Automated low-power states	▪ Puts processor, memory and I/O controller into the lowest available power states that will meet the requirements of the current workload.
Flexible Virtualization	▪ Enhances virtualization performance.
Intel® Xeon® processor 5500 Series	▪ Hardware assists boost virtualization performance by allowing OS more direct access to the hardware. ▪ Intel® Virtualization Technology[4] (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 OSs to read and change task priorities without VMM intervention. ▪ Extended Page Tables provide better performance by reducing the overhead caused by page-table utilization of virtual machines.
Intel® 5520 chipset	▪ Intel® VT for Directed I/O helps speed data movement, giving designated virtual machines their own dedicated I/O devices, thus reducing performance overhead of the VMM in managing I/O traffic.

Software

The operating systems and BIOSs listed below are supported on the Intel Xeon 5500 platform for embedded computing. Contact your preferred vendor or an Intel representative for operating system and BIOS solutions.

BIOS vendor/contacts:

American Megatrends Inc.*

Insyde Software Corp.*

Phoenix Technologies, Ltd.*

Operating System	Contacts
Microsoft Windows* XP	Intel provides drivers
Microsoft Windows Server* 2008	Intel provides drivers
Microsoft Windows* 2003	Intel provides drivers
Red Hat Enterprise Linux* 5	Red Hat
Novell SUSE Linux* Enterprise 10	Novell
Wind River VxWorks* 6.6	Wind River
Wind River Linux*	Wind River

Intel® Xeon® Processor 5500 Series for Embedded Computing

Processor Number	CPU Frequency	Intel® Turbo Boost Technology[2]	Intel® Hyper-Threading Technology[3]	L3 Cache	Number of Cores	Power	Robust Thermal Profile (High Tcase)	Intel® QuickPath Link Speed⁺	DDR3 Memory
Intel® Xeon® processor E5540ᐃ	2.53 GHz	Yes	Yes	8 MB	4	80W	Standard	5.86 GT/s	1066/800
Intel® Xeon® processor E5504ᐃ	2.00 GHz	No	No	4 MB	4	80W	Standard	4.8 GT/s	800
Intel® Xeon® processor L5518ᐃ	2.13 GHz	Yes	Yes	8 MB	4	60W	70° C (nominal) 85° C (short)	5.86 GT/s	1066/800
Intel® Xeon® processor L5508ᐃ	2.00 GHz	Yes	Yes	8 MB	2	38W	70° C (nominal) 85° C (short)	5.86 GT/s	1066/800

⁺GT/s = giga-transfers/second

Intel® 5520 Chipset for Embedded Computing

Product	Package	Features
Intel® 5520 I/O Hub (36D)	FCBGA1295	Supports Intel® Xeon® processor 5500 series at 6.4 GT/s, 5.86 GT/s and 4.8 GT/s speeds via Intel® QuickPath Technology interconnect. Supports 36 lanes of PCI Express* 2.0 I/O, Intel® VT-c and Intel® VT-d enhancements for virtualization OS, and Intel® ICH10R; 27.1W TDP. Optional second Intel® 5520 IOH supports up to 72 lanes PCI Express* 2.0.
Intel® I/O Controller Hub (ICH10R)	PBGA676	PCI Express* 6x1; six SATA ports; Intel® Matrix Storage Technology with RAID 0, 1, 5 and 10; 12 USB ports, Integrated Gigabit LAN controller 10/100/1000; 4.5W TDP.

Intel in Embedded and Communications: intel.com/embedded

ᐃ 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] E5540 Benchmarking results collected by Intel Corporation, January 2009
E5440 Benchmarking results collected by spec.org, October 2008 http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081013-05611.html

Platform configurations:
- Intel® Xeon® processor E5540, 2.53 GHz, 8 MB L3 cache, 80W + Intel® 5520 chipset 12 x 4GB RDIMM DDR3-1066MHz
- Intel® Xeon® processor E5440, 2.83 GHz, 8 MB L2 cache, 80W + Intel® 5000P Chipset 8 x 2 GB FBD-DDR2-667MHz

Software configurations:
- Intel® Xeon® processor E5540: OS: Red Hat Linux 64 bit; Compiler: Intel® C/C+ 11; Benchmark CPU2006 v1.1
- Intel® Xeon® processor E5440: OS: SUSE Linux Enterprise Server 10 (x86_64); Compiler: Intel® C/C+ 11; Benchmark: CPU2006 v1.1

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit intel.com/performance/resources/benchmark_limitations.htm

[2] Intel® Turbo Boost Technology requires a PC with a processor with Intel Turbo Boost Technology capability. Intel Turbo Boost Technology performance varies depending on hardware, software and overall system configuration. Check with your PC manufacturer on whether your system delivers Intel Turbo Boost Technology. For more information, see http://www.intel.com/technology/turboboost.

[3] Hyper-Threading Technology requires a computer system with a processor supporting Hyper-Threading Technology and an HT Technology-enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. For more information including details on which processors support HT Technology, see http://www.intel.com/products/ht/hyperthreading_more.htm

[4] Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain computer system software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

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