

Intel® Xeon® Processor E5-2600

Platform	Microarchitecture	Processor	Socket	Chipset
Intel Xeon E5 Series Processors and the Intel C600 Chipset <i>(formerly codenamed "Romley-EP")</i>	Sandy Bridge	Intel Xeon E5-2600 Series <i>(formerly codenamed "Sandy Bridge-EP")</i>	R	Intel C600 Chipset <i>(formerly codenamed "Patsburg")</i>

Sockets	1 – 2
Number of Cores	4, 6, or 8
Frequency	8-core CPUs up to 2.9 GHz
On Die Cache	Up to 20 MB shared L3 Cache
Interconnect Type and Speed	Quick Path Interconnect (up to 8.0 GT/s)
Memory Type	DDR3 up to 1600 MT/s
Max Memory Capacity	Up to 768 GB (on boards with 24 DIMMs)
I/O Type	Intel Integrated I/O supporting latest PCIe 3 specification

Best combination of performance, power efficiency, and cost.

Intel® Xeon® Processor E5-2600

What's new about the Intel® Xeon® Processor E5-2600
(formerly codenamed Sandy Bridge-EP on the Romley Platform)

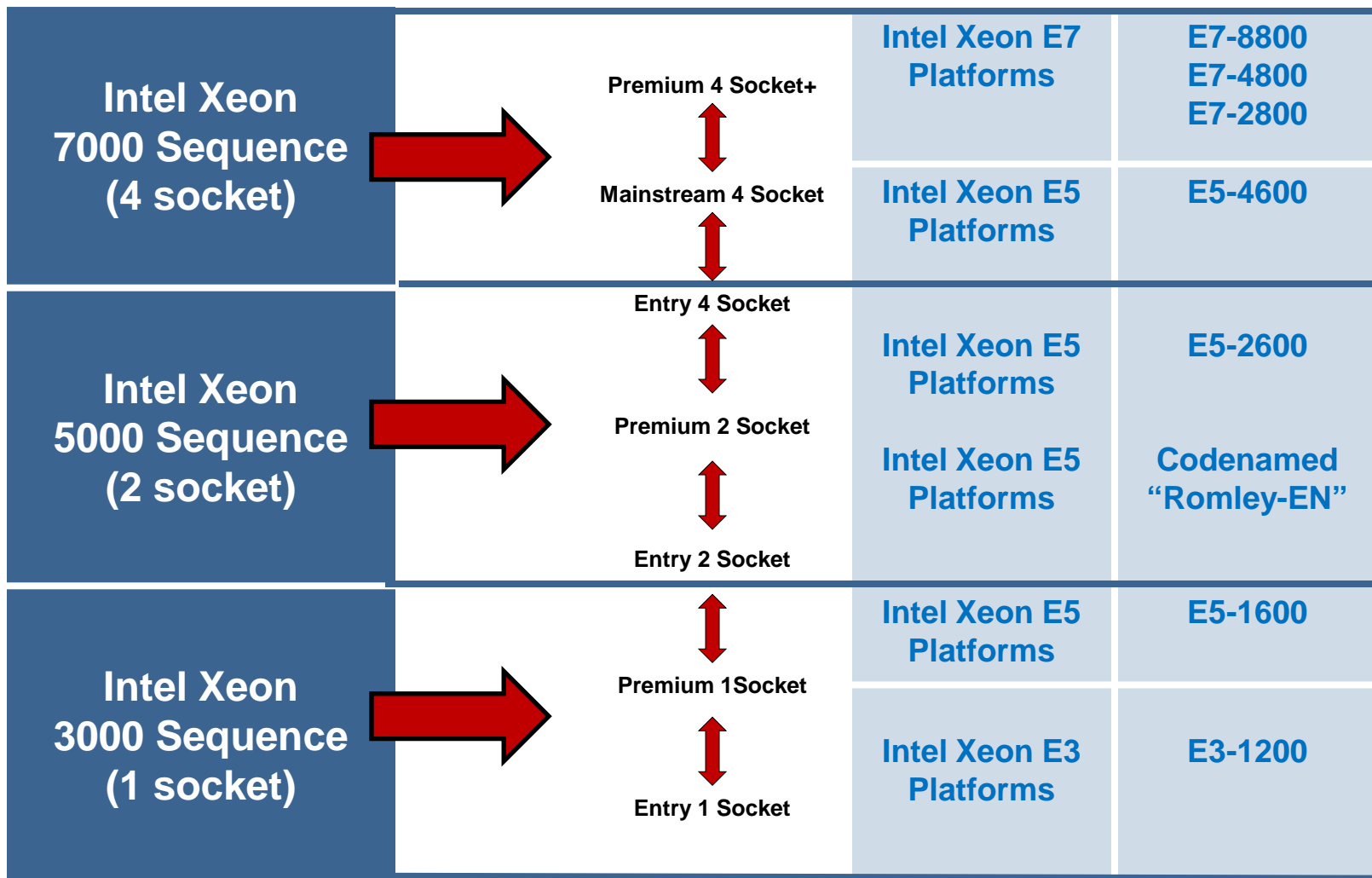
- **Up to 8 cores. Up to 16 threads. Up to 20MB cache.**
Dynamically scalable microarchitecture offers up to 8 cores per socket, up to 2 threads per core, and up to 20 MB shared cache.
- **PCIe 3.0 doubles the delivered bandwidth of PCIe 2.0**
Provides the increased I/O bandwidth required in enterprise deployments, with up to 40 lanes per socket
- **Intel® Intelligent Power Technology**
IPT automatically shifts the CPU and memory into the lowest available power state, reducing energy costs.
- **Intel® Turbo Boost Technology 2.0**
Optimized Intel® Turbo Boost maximizes CPU performance during workload spikes by allowing the CPU to briefly operate above TDP. The processor still operates within a closely controlled thermal envelope, controlled by fuse settings and highly-accurate sensors
- **Intel® Hyper-Threading Technology**
Hyper-Threading allows thread-level parallelism on each processor, resulting in more efficient use of processor resources. With higher processing throughput, you enjoy substantially improved performance.
- **Advanced Instruction Sets**
Intel® AES-NI (Advanced Encryption Standard New Instructions) accelerates encryption and decryption speeds, allowing broader use of encryption to improve data security.
Intel® Advanced Vector Extensions (AVX) Instructions deliver improved performance on floating point-intensive applications.
- **Intel® Virtualization Technology (Intel VT-x, VT-d, VT-c)**
Higher-level VMM Functions, including resource discovery, provisioning, scheduling, and user interface. Processor virtualization, memory virtualization, I/O device virtualization.

Expert included.



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Transitions: Intel Xeon Server Roadmap



Expert included.



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Process	TDP ¹	CPU Number	Frequency	Cores / Threads	Cache	QPI Speed	Max Mem Speed	Turbo Boost Specification	Max Turbo Frequency ²	HT		
32nm	135W	E5-2690	2.9 GHz					4 / 4 / 4 / 5 / 5 / 7 / 7 / 9	3.8 GHz			
	130W	E5-2680	2.7 GHz					4 / 4 / 5 / 5 / 5 / 7 / 8 / 8	3.5 GHz			
	115W	E5-2670	2.6 GHz	8 / 16	20MB	8.0 GT/s	1600 MT/s	4 / 4 / 5 / 5 / 6 / 6 / 7 / 7	3.3 GHz	Yes		
		E5-2665	2.4 GHz					4 / 4 / 5 / 5 / 6 / 6 / 7 / 7	3.1 GHz			
	95W	E5-2660	2.2 GHz					5 / 5 / 6 / 6 / 7 / 7 / 8 / 8	3.0 GHz			
		E5-2650	2.0 GHz					4 / 4 / 5 / 5 / 5 / 7 / 8 / 8	2.8 GHz			
	130W	E5-2667	2.9 GHz	6 / 12	15MB	8.0 GT/s	1600 MT/s	3 / 3 / 3 / 4 / 5 / 6	3.5 GHz	Yes		
			E5-2640	2.5 GHz				3 / 3 / 4 / 4 / 5 / 5	3.0 GHz			
		95W	E5-2630	2.3 GHz	6 / 12	15MB	7.2 GT/s	1333 MT/s	3 / 3 / 4 / 4 / 5 / 5		2.8 GHz	
			E5-2620	2.0 GHz				3 / 3 / 4 / 4 / 5 / 5	2.5 GHz			
	130W	E5-2643	3.3 GHz	4 / 8	10MB	8.0GT/s	1600 MT/s	1 / 1 / 2 / 2	3.5 GHz	Yes		
			E5-2637	3.0 GHz	2 / 4	5MB	8.0GT/s	1600 MT/s	5 / 5		3.5 GHz	
		80W	E5-2609	2.4 GHz	4 / 4	10MB	6.4 GT/s	1066 MT/s	n/a		No	No
			E5-2603	1.8 GHz					n/a			
LOW POWER	70W	E5-2650L	1.8 GHz	8 / 16	20MB	8.0 GT/s	1600 MT/s	2 / 2 / 3 / 3 / 4 / 4 / 5 / 5	2.3 GHz	Yes		
60W	E5-2630L	2.0 GHz	6 / 12	15MB	7.2 GT/s	1333 MT/s	3 / 3 / 4 / 4 / 5 / 5	2.5 GHz				

¹ TDP is Thermal Design Power

² See pages 7 and 8 for information about interpreting the Turbo Boost specification.

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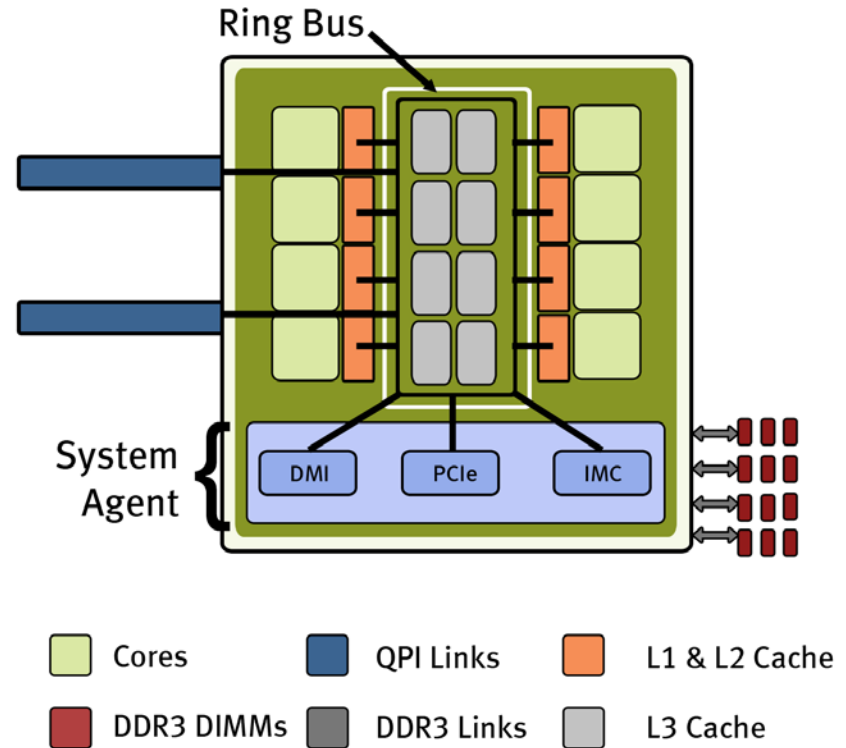
Chip Diagram / Ring Bus

The ring bus architecture delivers an efficient bi-directional highway for data movement.

- The PCI controller has been moved onto the CPU. With the PCIe 3.0 standard supported by these processors, there are 40 PCIe 3.0 lanes per processor.
- Compared to Xeon 5500/5600:
 - ✓ Lower L3 cache latency (~20%)
 - ✓ Higher bandwidth between cores, L3, Memory, and I/O
 - ✓ Up to 8x more L3-cache-to-core bandwidth

The Intel Xeon E5-2600 is the first server processor with integrated PCIe.

- The E5-2600 supports the PCIe 3.0 specification.
- PCIe 3.0 delivers breakthrough platform performance and scale
 - ✓ Reduces I/O latency by up to 32%
 - ✓ Offers up to 40 lanes of PCIe per socket
 - ✓ Improves I/O bandwidth by up to 2 times





Intel® Xeon® Processor E5-2600

Chipset / Platform Information

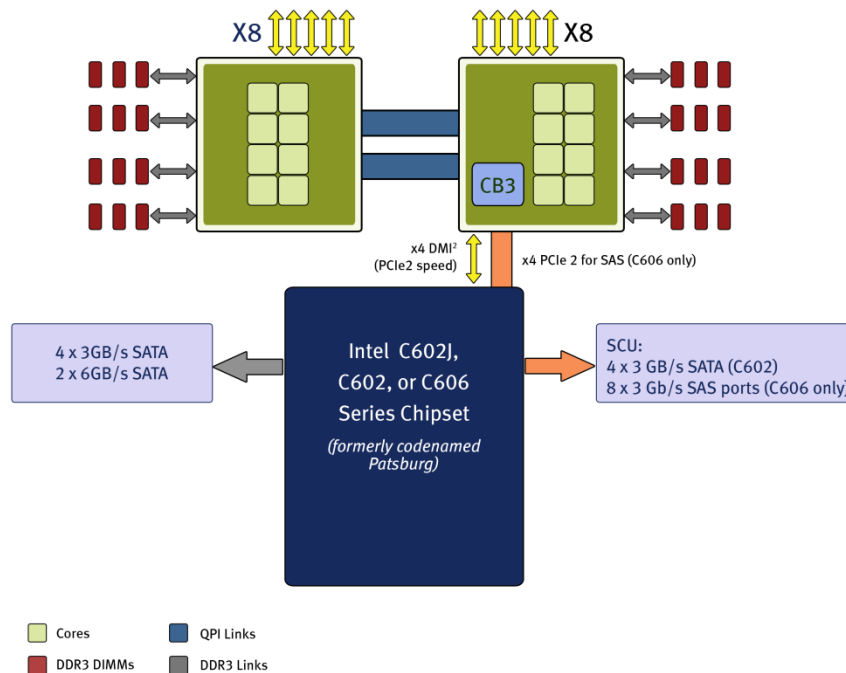
Intel® C600 Series Chipset Overview (formerly codenamed "Patsburg")

All chipsets come with 4 x 3Gb/s SATA ports and 2 x 6Gb/s SATA ports from AHCI.

- **C602J:** 6 x SATA ports only
- **C602:** 6 x SATA ports + 4 x 3Gb/s SATA ports from SCU
- **C606:** 6 x SATA ports + 8 x 3Gb/s SAS ports from SCU + PCIe 1.0 x4 uplink to CPU

RAID capabilities:

- All chipsets include Intel RSTe RAID 0/1/10/5 for SATA (AHCI) ports.
- Intel RSTe RAID 0/1/10 is included for SAS (SCU) ports on C606-based boards.

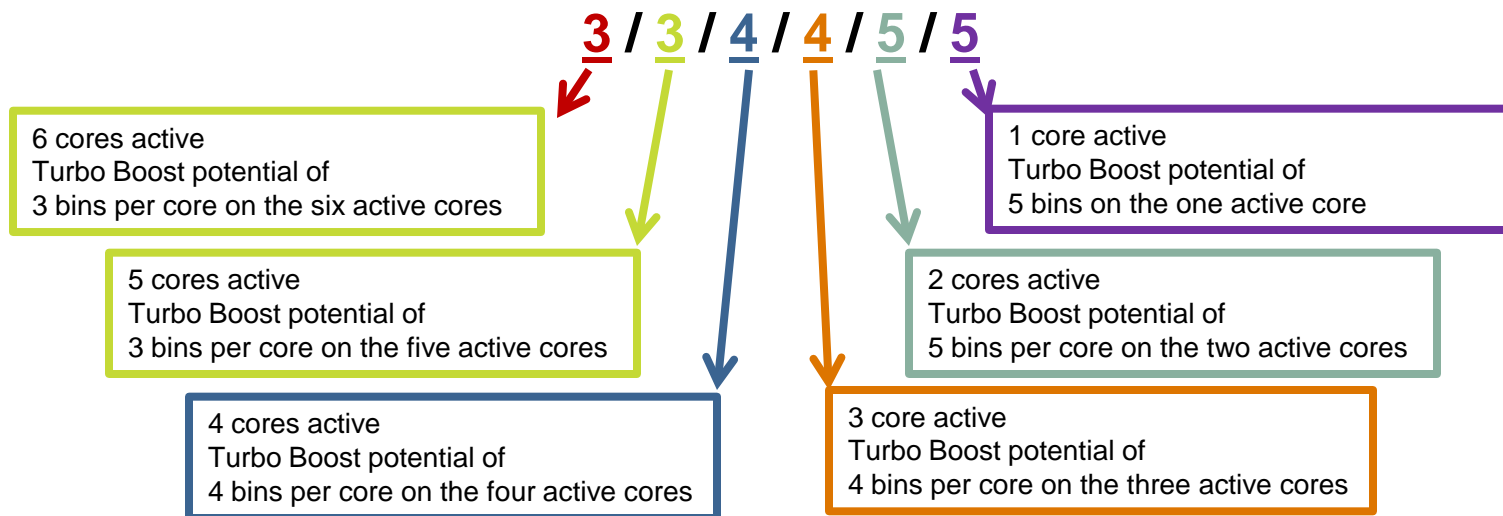


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About Turbo Boost 2.0

Turbo Boost 1.0 dynamically increased the frequency of active cores based on temperature, current, power consumption, and operating system states. It did not, however, exceed programmed power limits. Turbo Boost 2.0 allows the processor to exceed its power ceiling in a burst, until it reaches its thermal limit, at which point it reduces power to conform to those same programmed limits.



- This example is based on the Intel Xeon processor E5-2620: 6 cores, 2.00 GHz, with a Turbo Boost specification of 3 / 3 / 4 / 4 / 5 / 5. When thermal headroom exists or a core is idle, Turbo Boost increases the base frequency of the cores.
- The first number corresponds to the boost potential of 3 bins per core when all six cores are active. The second number refers to the boost potential of 3 bins per core when five cores are active. The third number refers the boost potential of 4 bins per core when four cores are active. The fourth number refers to the boost potential of 4 bins per core when three cores are active. The fifth number refers to the boost potential of 5 bins per core when two cores are active. The sixth number refers to the boost potential of 5 bins when one core is active.



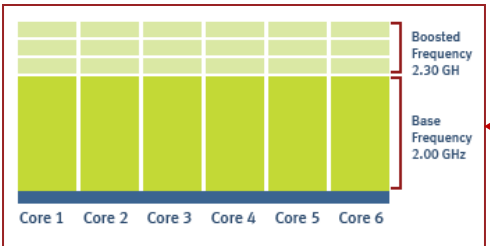
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Interpreting the Turbo Boost Specification

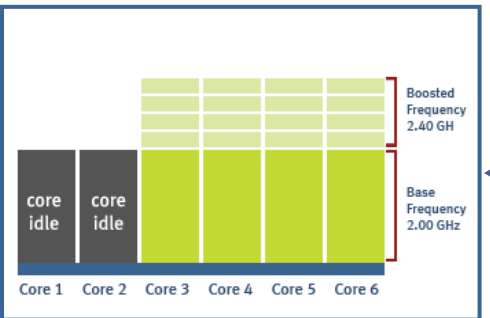
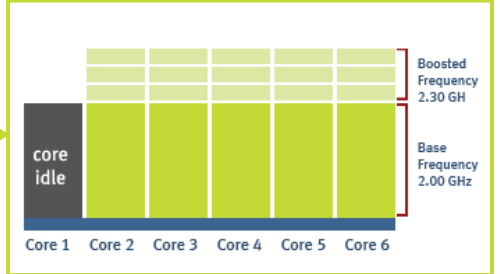
3 / 3 / 4 / 4 / 5 / 5

Base Frequency: 2.00 GHz



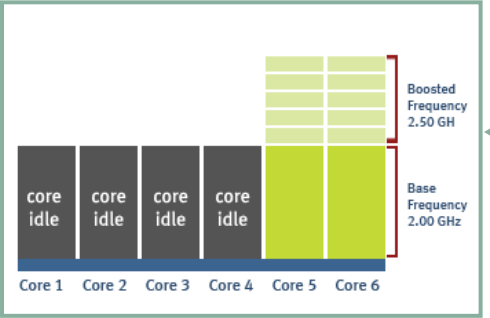
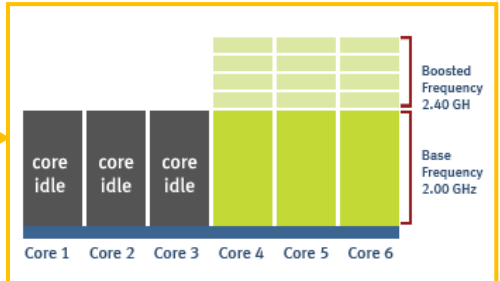
In Use: 6 cores
Turbo Boost: 3 bins
Boosted Frequency: 2.3 GHz

In Use: 5 cores
Turbo Boost: 3 bins
Boosted Frequency: 2.3 GHz



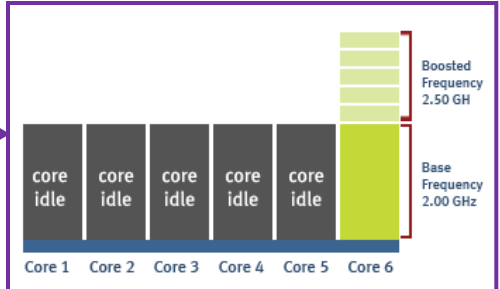
In Use: 4 cores
Turbo Boost: 4 bins
Boosted Frequency: 2.4 GHz

In Use: 3 cores
Turbo Boost: 4 bins
Boosted Frequency: 2.4 GHz



In Use: 2 cores
Turbo Boost: 5 bins
Boosted Frequency: 2.5 GHz

In Use: 1 core
Turbo Boost: 5 bins
Boosted Frequency: 2.5 GHz



Expert included.



Intel® Xeon® Processor E5-2600

Memory Overview

Platform capability:

- Up to 4 channels per CPU
- Up to 3 DIMMs per channel

Memory types supported:

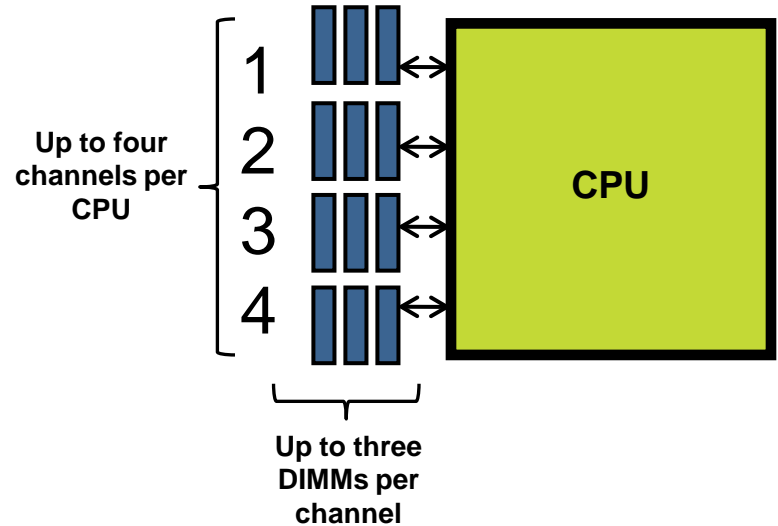
- UDIMM, RDIMM, LRDIMM
- Single-rank (SR), dual-rank (DR), or Quad-Rank (QR)
- DDR3 up to 1600 MT/s

Memory Restrictions

- 32GB support dependent upon DIMM availability.

Memory speed is affected by 3 major factors:

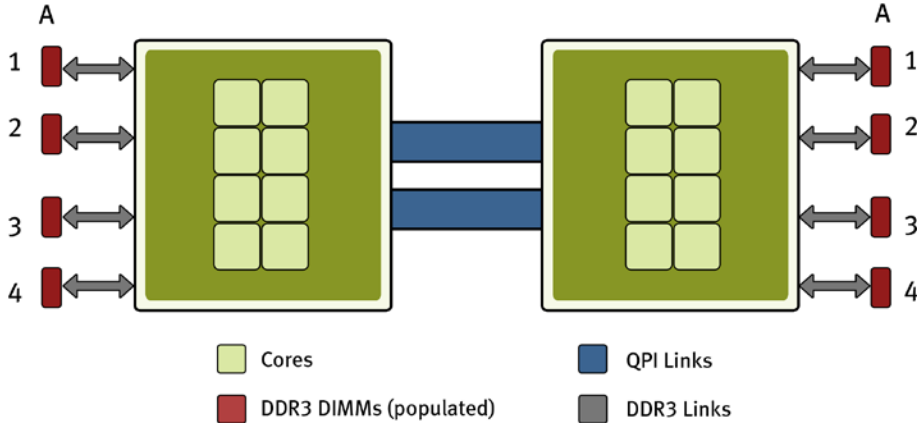
- The memory controller in the CPU (see page 4, "Max Mem Speed")
- How many DIMMs are populated per channel (see pages 10, 11, and 12)
- If DIMMs slots are populated with memory of different speeds, all channels in the system will run at the fastest **common** frequency.



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Memory Population Guidelines



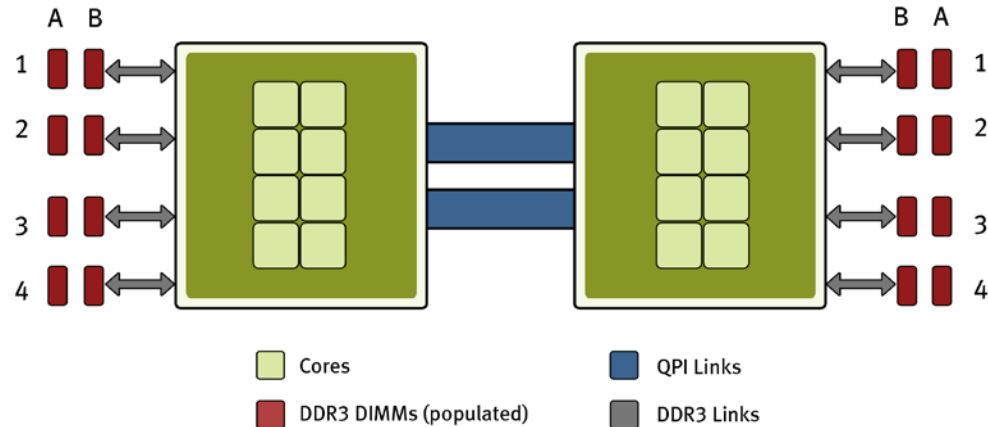
Mainboards with 1 DIMM per Channel (8 DIMM Slots)

	DIMM Bank A	Max MHz, 1.5V DIMMs	Max MHz, 1.35V DIMMs
UDIMM	1 or 2 Rank	1600	1333
RDIMM	1 or 2 Rank	1600	1333
	4 Rank	1066	800
LRDIMM	4 Rank	1333	1333

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Memory Population Guidelines



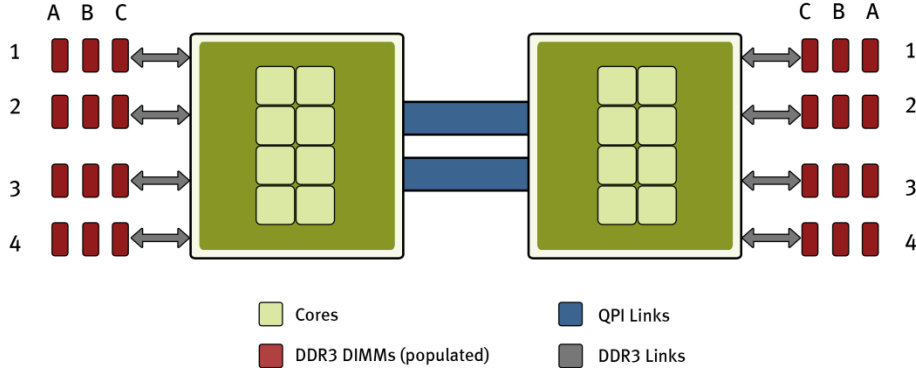
Mainboards with 2 DIMMs per Channel (16 DIMM Slots)

	DIMM Bank A	DIMM Bank B	Max MHz, 1.5V DIMMs	Max MHz, 1.35V DIMMs
UDIMM	1 or 2 Rank	Empty	1333	1333
	1 or 2 Rank	1 or 2 Rank	1333	1066
RDIMM	1 or 2 Rank	1 or 2 Rank or Empty	1600	1333
	4 Rank	Empty	1066	800
	4 Rank	4 Rank or Empty	800	800
LRDIMM	4 Rank	4 Rank or Empty	1333	1066



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Memory Population Guidelines



Mainboards with 3 DIMMs per Channel (24 DIMM Slots)

	DIMM Bank A	DIMM Bank B	DIMM Bank C	Max MHz, 1.5V DIMMs	Max MHz, 1.35V DIMMs
UDIMM	1 or 2 Rank	1 or 2 Rank or Empty	n/a	1333	1066
RDIMM	1 or 2 Rank	1 or 2 Rank or Empty	Empty	1600	1333
	1 or 2 Rank	1 or 2 Rank	1 or 2 Rank	1066	n/a
	4 Rank	Empty	Empty	1066	800
	4 Rank	4 Rank	Empty	800	800
	4 Rank	4 Rank	4 Rank	n/a	n/a
LRDIMM	4 Rank	4 Rank or Empty	Empty	1333	1066
	4 Rank	4 Rank	4 Rank	1066	1066

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Silicon Mechanics Products with Intel® Xeon® Processor E5-2600 Series CPUs

Rackmount Servers

1U Servers

- [Rackform iServ R331.v3](#)
- [Rackform iServ R335.v3](#)
- [Rackform iServ R352.v3](#)

2U Servers

- [Rackform iServ R346.v3](#)

High-Density 1U and 2U Twins

- [Rackform iServ R4410.v3](#)
- [Rackform iServ R4412.v3](#)

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Contact Silicon Mechanics

For answers regarding processor selection,
memory, or other questions you may have,
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