



DATACENTER GROUP UPDATE

Risk Factors

The above statements and any others in this document that refer to plans and expectations for the quarter, the year and the future are forward-looking statements that involve a number of risks and uncertainties. Words such as “anticipates,” “expects,” “intends,” “plans,” “believes,” “seeks,” “estimates,” “may,” “will,” “should” and their variations identify forward-looking statements. Statements that refer to or are based on projections, uncertain events or assumptions also identify forward-looking statements. Many factors could affect Intel's actual results, and variances from Intel's current expectations regarding such factors could cause actual results to differ materially from those expressed in these forward-looking statements. Intel presently considers the following to be the important factors that could cause actual results to differ materially from the company's expectations. Demand could be different from Intel's expectations due to factors including changes in business and economic conditions; customer acceptance of Intel's and competitors' products; supply constraints and other disruptions affecting customers; changes in customer order patterns including order cancellations; and changes in the level of inventory at customers. Uncertainty in global economic and financial conditions poses a risk that consumers and businesses may defer purchases in response to negative financial events, which could negatively affect product demand and other related matters. Intel operates in intensely competitive industries that are characterized by a high percentage of costs that are fixed or difficult to reduce in the short term and product demand that is highly variable and difficult to forecast. Revenue and the gross margin percentage are affected by the timing of Intel product introductions and the demand for and market acceptance of Intel's products; actions taken by Intel's competitors, including product offerings and introductions, marketing programs and pricing pressures and Intel's response to such actions; and Intel's ability to respond quickly to technological developments and to incorporate new features into its products. The gross margin percentage could vary significantly from expectations based on capacity utilization; variations in inventory valuation, including variations related to the timing of qualifying products for sale; changes in revenue levels; segment product mix; the timing and execution of the manufacturing ramp and associated costs; start-up costs; excess or obsolete inventory; changes in unit costs; defects or disruptions in the supply of materials or resources; product manufacturing quality/yields; and impairments of long-lived assets, including manufacturing, assembly/test and intangible assets. Intel's results could be affected by adverse economic, social, political and physical/infrastructure conditions in countries where Intel, its customers or its suppliers operate, including military conflict and other security risks, natural disasters, infrastructure disruptions, health concerns and fluctuations in currency exchange rates. Expenses, particularly certain marketing and compensation expenses, as well as restructuring and asset impairment charges, vary depending on the level of demand for Intel's products and the level of revenue and profits. Intel's results could be affected by the timing of closing of acquisitions and divestitures. Intel's results could be affected by adverse effects associated with product defects and errata (deviations from published specifications), and by litigation or regulatory matters involving intellectual property, stockholder, consumer, antitrust, disclosure and other issues, such as the litigation and regulatory matters described in Intel's SEC reports. An unfavorable ruling could include monetary damages or an injunction prohibiting Intel from manufacturing or selling one or more products, precluding particular business practices, impacting Intel's ability to design its products, or requiring other remedies such as compulsory licensing of intellectual property. A detailed discussion of these and other factors that could affect Intel's results is included in Intel's SEC filings, including the company's most recent reports on Form 10-Q, Form 10-K and earnings release.

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This document contains information on products in the design phase of development.

All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice.

Intel may make changes to specifications and product descriptions at any time, without notice.

Roadmap not reflective of exact launch granularity and timing – please refer to ILU guidance

Any code names featured are used internally within Intel to identify products that are in development and not yet publicly announced for release. Customers, licensees and other third parties are not authorized by Intel to use code names in advertising, promotion or marketing of any product or services and any such use of Intel's internal code names is at the sole risk of the user.

Material in this presentation is intended as product positioning and not approved end user messaging.

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>

Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Click

http://www.intel.com/products/processor_number for details

Intel® Hyper-Threading Technology requires a computer system with a processor supporting HT 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/info/hyperthreading>

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 here.

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

<http://www.intel.com/technology/security>

The original equipment manufacturer must provide TPM functionality, which requires a TPM-supported BIOS. TPM functionality must be initialized and may not be available in all countries.

Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, 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, see <http://www.intel.com/go/virtualization>.

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/>.

HD Graphics P4000 introduces four additional execution units, going from 8 in the HD P3000 to 12 in the HD P4000. Optimized Intel® HD Graphics P4000 only available on select models of the Intel® Xeon® processor E3-1200 v2 product family. For more information, visit <http://www.intel.com/content/www/us/en/architecture-and-technology/hdgraphics/hdgraphics-developer.html>

No system can provide absolute security under all conditions. Requires an Intel® Identity Protection Technology-enabled system, including a 2nd gen or higher Intel® Core™ processor enabled chipset, firmware and software, and participating website. Consult your system manufacturer. Intel assumes no liability for lost or stolen data and/or systems or any resulting damages. For more information, visit <http://ipt.intel.com/>.

Legal Information

Intel® Run Sure Technology No computer system can provide absolute reliability, availability or serviceability. Requires an Intel® Xeon® processor E7-8800/4800/2800 v2 product families or Intel® Itanium® 9500 series-based system (or follow-on generations of either.) Built-in reliability features available on select Intel® processors may require additional software, hardware, services and/or an internet connection. Results may vary depending upon configuration. Consult your system manufacturer for more details.

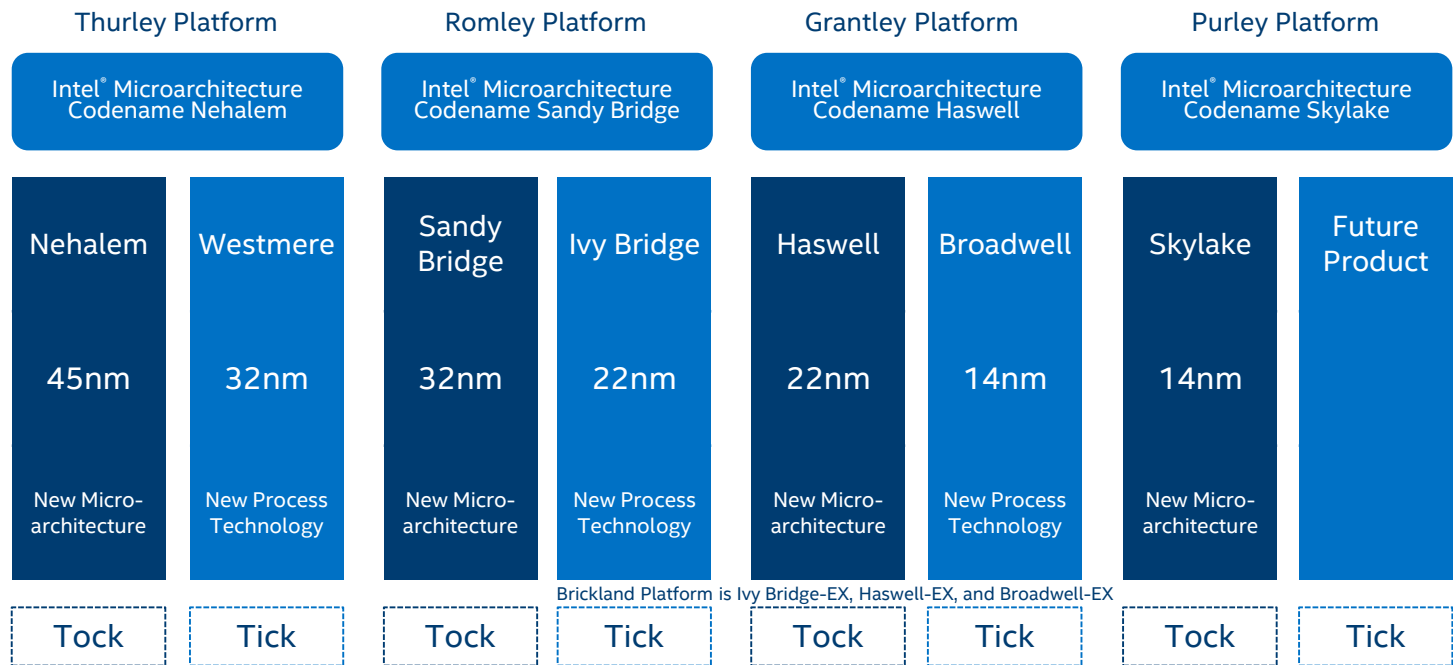
For systems also featuring Resilient System Technologies: No computer system can provide absolute reliability, availability or serviceability. Requires an Intel® Run Sure Technology-enabled system, including an enabled Intel processor and enabled technology(ies). Built-in reliability features available on select Intel® processors may require additional software, hardware, services and/or an Internet connection. Results may vary depending upon configuration. Consult your system manufacturer for more details.

Intel® Pro Wireless No computer system can provide absolute security under all conditions. Intel® Pro Wireless Display Network Security features require a system with an Intel® Processor with vPro™ Technology, 1080p and Blu-Ray or other protected content playback only available on select Intel® processor-based systems with built-in visuals enabled, a compatible Intel® WiDi adapter and media player, and supporting Intel® WiDi software and graphics driver installed. Consult your device manufacturer. For more information, see www.intel.com/go/widi

Intel® Platform/Device Protection Technology *(includes the following features: Bios guard; Boot Guard; Platform Trust Technology {PTT}; OS Guard; Anti-Theft Technology {AT}; Trusted Execution Technology {TXT}; and Execute Disable Bit)* No computer system can provide absolute security. Requires an enabled Intel® processor, enabled chipset, firmware, software and may require a subscription with a capable service provider (may not be available in all countries). Intel assumes no liability for lost or stolen data and/or systems or any other damages resulting thereof. Consult your system or service provider for availability and functionality.

Tick-Tock Development Model:

Sustained Microprocessor Innovation Leadership



Innovation delivers new microarchitecture with Skylake

Roadmap Positioning

Shipping

In Development

2016

2017



Expandable

Brickland Platform

Intel® Xeon® processor E7-8800/4800 v3 product families / Intel® C602J chipset, Intel® C114/C112 Scalable Memory Buffer

Brickland Platform

Intel® Xeon® processor E7-8800/4800 v4 product families / Intel® C602J chipset, Intel® C114/C112 Scalable Memory Buffer

Efficient Performance
4S/Performance Comms

Grantley-EP 4S Platform

Intel® Xeon® processor E5-4600 v3 product family / Intel® C610 series chipset

Grantley-EP 4S Platform

Intel® Xeon® processor E5-4600 v4 product family / Intel® C610 series chipset

Efficient Performance
2S/Performance & Mid-Range
Storage/Performance Comms

Grantley-EP 2S Platform

Intel® Xeon® processor E5-2600 v4 product family/Intel® C610 series chipset
Intel® Ethernet XL710 controller
Intel® Ethernet X550 controller

Optimized for Comms
Performance

Intel® 8900 Chipset option w/ QuickAssist Acceleration

Scalable Performance 2S, 4S, 8S+

Purley Platform

Intel® Xeon® processor product family/Intel® C62x series chipset

Intel® Omni-Path Architecture

Apache Pass (2018)

Intel® Solid-State Drive (Cliffdale)

Intel® Ethernet XL710 controller
Intel® Ethernet X550 controller

Intel® Xeon Phi™

Intel® Xeon Phi™ x100 Product Family

Intel® Xeon Phi™ coprocessor 7100 / 5100 / 3100 family

Intel® Xeon Phi™ x200 Product Family

Intel® Xeon Phi™ coprocessor (codenamed Knights Landing), binary compatible w/SkyLake CPU

1S Workstation

Grantley-EP 1S Workstation Platform

Intel® Xeon® processor E5-1600 v3 product family / Intel® C610 series chipset
Intel® Ethernet XL710 controller

Grantley-EP 1S Workstation Platform

Intel® Xeon® processor E5-1600 v4 product family/Intel® C610 series chipset
Intel® Ethernet XL710 controller

Basin Falls 1S Workstation Platform

Intel® Xeon® processor product family (Skylake-W socket R)
Kaby Lake PCH

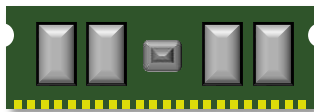
Purley: Biggest Platform Advancement Since Nehalem

PERFORMANCE FOR RANGE OF WORKLOADS



- 1.5X memory bandwidth with 6 vs. 4 memory channels
- Intel® AVX-512 new instructions

ALL NEW MEMORY ARCHITECTURE



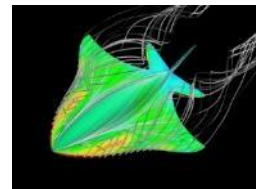
- Up to 6TB capacity in a 2S system & lower cost than DRAM
- Persistent data

OPTIONAL INTEGRATED NETWORK / FABRIC



- 1/10G Intel® Ethernet
- 100G Intel® Omni-Path Architecture

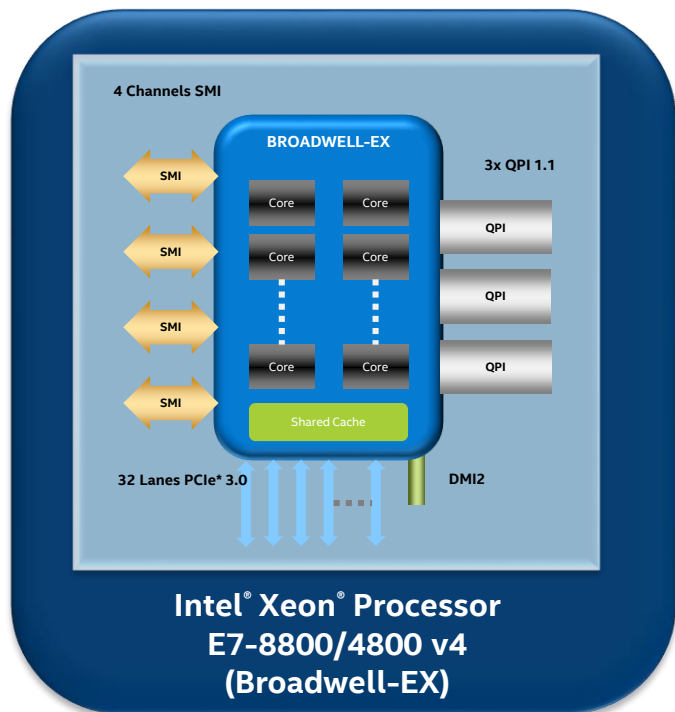
OPTIONAL INTEGRATED ACCELERATORS



- Intel® QuickAssist Technology encryption and compression offloads
- Skylake-SP + FPGA

Intel® Xeon® Processor E7-8800/4800 v4

Product Families - Highlights



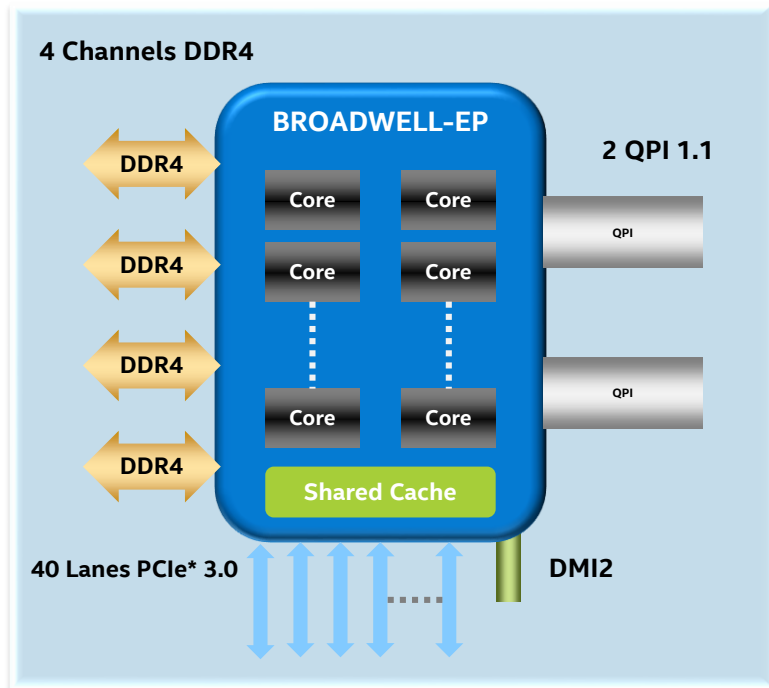
- “Broadwell” - built on 14nm process technology for Servers (Broadwell-EX)
- New CPU that is socket compatible for the Brickland platform
- Socket R1: up to 24 cores/48 threads
- Last-level Cache: up to 60 MB
- Three Intel® QPI v1.1 links per socket
- Up to 24 DIMMS per socket (3DPC/ 96 DIMMS)
- Four Intel® SMI Gen2 per socket (Intel® C112/C114 Scalable Memory Buffer)



Results were derived using simulations run on an architecture simulator or model. Any difference in system hardware or software design or configuration may affect actual performance. Intel product plans in this presentation do not constitute Intel plan of record product roadmaps. Please contact your Intel representative to obtain Intel's current plan of record product roadmaps. 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>

Intel® Xeon® Processor E5-2600 v4 Product Family

Overview



- Broadwell microarchitecture - built on 14nm process technology for Servers/Workstations (codenamed “Broadwell-EP”)
- Socket compatible[◇] replacement for Intel® Xeon® processor E5-2600 v3 product family on Grantley platform
- New and increased Resource Monitoring and Allocation capabilities, provide optimum data center Orchestration and Virtualization experience.
- Enhanced hardware assisted Security features

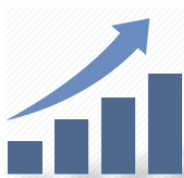
[◇] Requires BIOS and firmware update

XEON PHI UPDATE



Intel® Xeon Phi™ Product Family

An essential element of Intel® Scalable System Framework



Breakthrough **Highly-Parallel Performance**

- Up to >3 TFLOPs² per socket
- Up to >4.5x FLOPs² per processor than Intel® Xeon® E5-2600 v3
- Up to 72 cores, 512-bit SIMD vectors with 2 VPU/core



Removes Barriers through **Integration**

- Integrated memory delivers up to >7x bandwidth per processor than Intel® Xeon® E5-2600 v3
- Integrated Intel® Omni-Path fabric (dual-port; 50 GB/s ↔) increases price-performance and density



Better ROI than GPU/IBM POWER*¹

- Binary-compatible with Intel® Xeon® processors
- Eliminates add-in card PCIe* offload bottleneck and utilization constraints
- Open standards, libs & frameworks

For highly-parallel compute & memory BW intensive workloads

*Other brands and names are the property of their respective owners

All specifications refer to the future Intel® Xeon Phi™ processor (Knights Landing) unless otherwise noted

All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice.

¹ Based on customer feedback comparing Intel® Xeon Phi™ product family with NVIDIA Tesla (CUDA) GPU, considering price, programming expense, utilization, and maintenance cost.

² Intel internal analysis comparing the future Intel® Xeon Phi™ processor (Knights Landing) with the Intel® Xeon® processor E5-2697v3

Performance comparisons to be updated to Intel® Xeon® processor E5-2600v4 and Nvidia Pascal GPU when available



Intel® Xeon Phi™ Product Family

Highly-Parallel Roadmap



Available Today

Knights Corner

Intel® Xeon Phi™
x100 Product Family

- 22 nm process
- Coprocessor only
- >1 TF DP Peak
- Up to 61 Cores
- Up to 16GB GDDR5



Coming 2016

Knights Landing

Intel® Xeon Phi™
x200 Product Family

- 14 nm process
- Host Processor & Coprocessor
- >3 TF DP Peak¹
- Up to 72 Cores
- Up to 16GB HBM
- Up to 384GB DDR4²
- ~465 GB/s STREAM
- Integrated Fabric²

Future

Knights Hill

3rd generation

- 10 nm process
- Integrated Fabric (2nd Generation)
- In Planning...

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*Results will vary. This simplified test is the result of the distillation of the more in-depth programming guide found here: <https://software.intel.com/sites/default/files/article/383067/is-xeon-phi-right-for-me.pdf> All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice. ¹ Over 3 Teraflops of peak theoretical double-precision performance is preliminary and based on current expectations of cores, clock frequency and floating point operations per cycle. FLOPS = cores x clock frequency x floating-point operations per second per cycle. ² Host processor only.



Knights Corner ➡ Knights Landing

Knights Landing is a game-changer coming in 2016



Today

Available

Q2'16 Developer Access & Early-ship; **Q3'16** General Availability

Intel architecture

Programming

Binary-compatible with Intel® Xeon® processors

Up to **61 in-order** cores (enhanced P54C)

Cores

Up to **72 out-of-order** cores (enhanced Silvermont)

Up to **16GB** GDDR5

Memory

Up to **400GB** (16GB MCDRAM and 384GB DDR4)

Up to **181 GB/s** STREAM (to GDDR5)

Memory BW

Up to **~460 GB/s** STREAM (to MCDRAM)

SP: up to 2.416 TFLOPs¹
DP: up to 1.208 TFLOPs¹

Performance

Up to **~2.5x** higher perf¹

Up to 3.5 GF/W (DGEMM)

Power Efficiency

Up to **~3.5x** higher perf/watt

None

Fabric

Dual-port **50 GB/s bi-directional** (on-package)

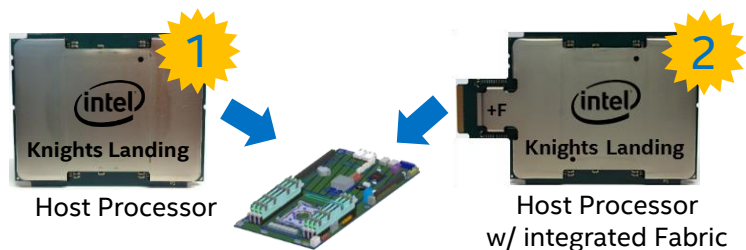
¹ Peak theoretical floating point operations per second (FLOPs)
All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice.



Three (3) Knights Landing Products

PCIe* coprocessor or standalone host server processor with int fabric

Knights Landing Processor



Groveport Platform
"Self-boot" Intel® Xeon Phi™ processor platform

Solution for general purpose servers and workstations

- Targeted for applications with larger sections of serial work¹
- Upgrade path from Knights Corner as PCIe* card

Knights Landing Coprocessor



Ingredient of Grantley & Purley Platforms

Requires Intel® Xeon® processor host

Solution for future clusters with both Xeon and Xeon Phi

- Binary-compatible with Intel® Xeon® processor (Broadwell)
- Higher performance density for highly parallel applications²
- Reduced system power consumption²
- Higher perf/Watt & perf/\$\$³

^{*}Other names and brands may be claimed as the property of others.

¹ Projections based on early product definition and as compared to prior generation Intel® Xeon Phi™ Coprocessors

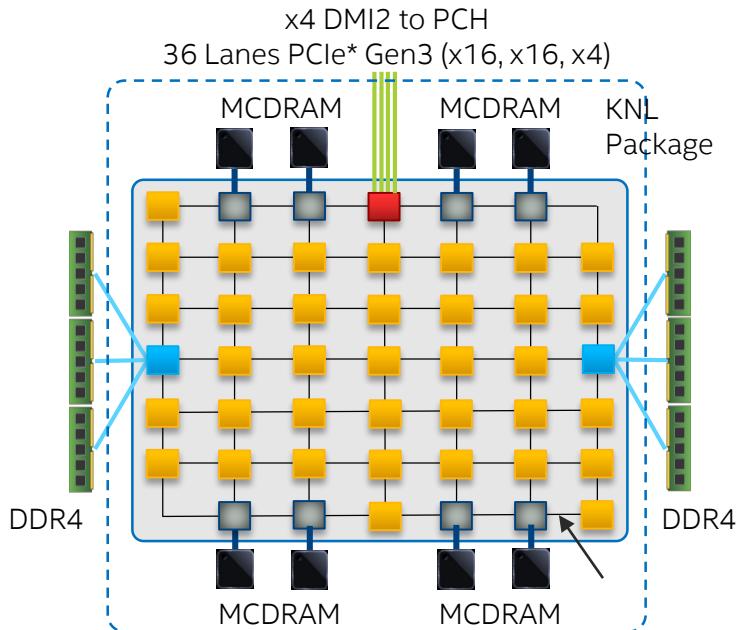
² Based on Intel internal analysis. Lower power based on power consumption estimates between (2) HCAs compared to 15W additional power for KNL-F. Higher density based on removal of PCIe* slots and associated HCAs populated in those slots.

³ Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance.



Intel® Xeon Phi™ Product Family x200

Codename: Knights Landing



Highlights

- Up to 72 cores**
- Intel® Advanced Vector Extensions 512 (AVX-512)
- Over 3 Teraflops dual-precision performance^{1**}
- ~490 GB/s sustained memory bandwidth (STREAM)
- Up to 16GB integrated high-bandwidth memory
- Binary-compatible with Intel® Xeon® processors
- 2 ports integrated Intel® Omni-Path Fabric**
- Up to 384GB platform memory (DDR4)**

Typical Workloads

Workloads that scale to many threads, make extensive use of vectorization, and/or require significant memory bandwidth.

- Scientific (life sciences, weather, finance, energy, manufacturing, ...)
- Visualization (professional rendering, scientific visualization, ...)
- Analytics (deep learning training, big data analytics, ...)

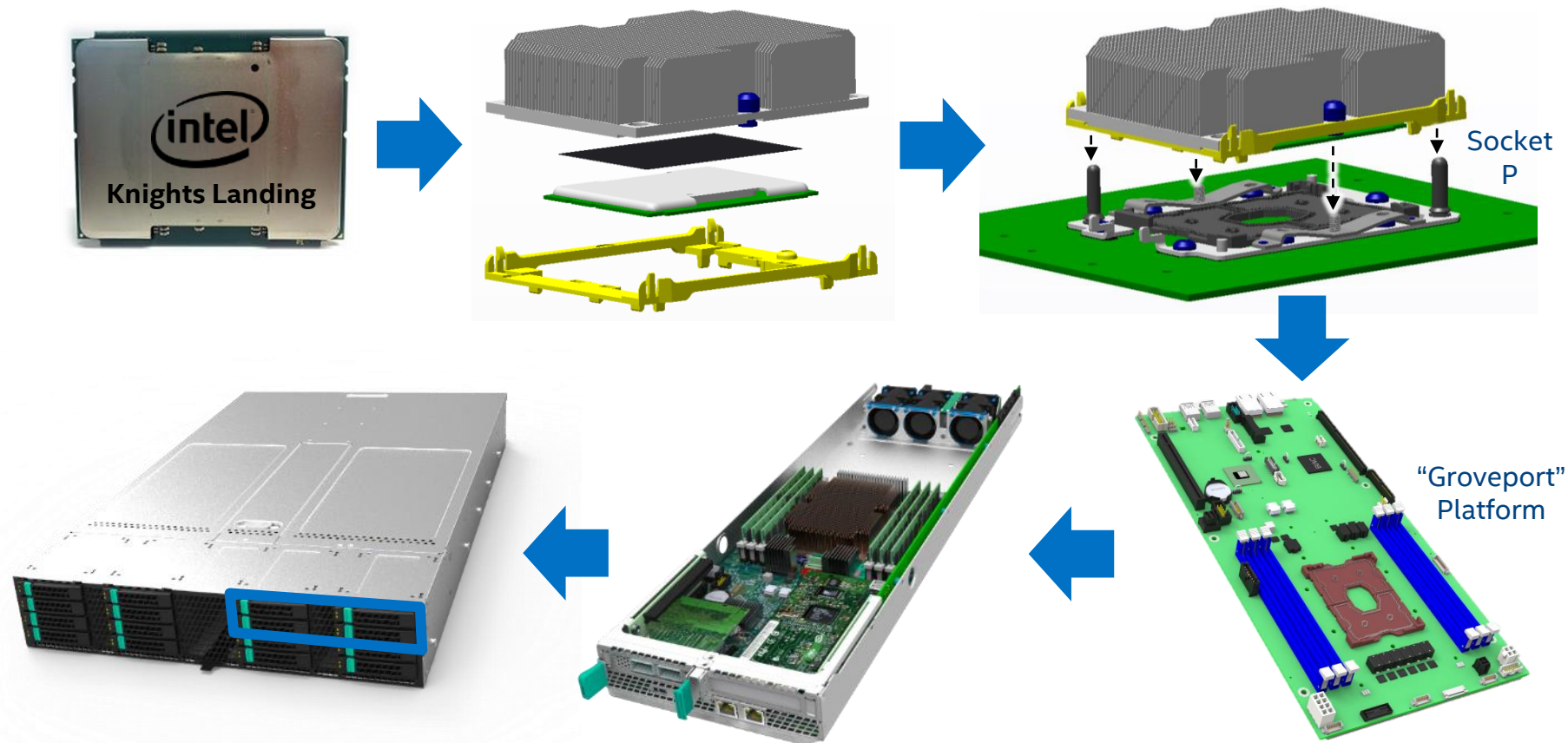
All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice

**Bootable host processor form factor only

¹ Over 3 Teraflops of peak theoretical double-precision performance is prelim and based on current expectations of cores, frequency and floating point operations per cycle (FLOPS) = cores x frequency x floating-point ops per second per cycle.

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Knights Landing Host Processor

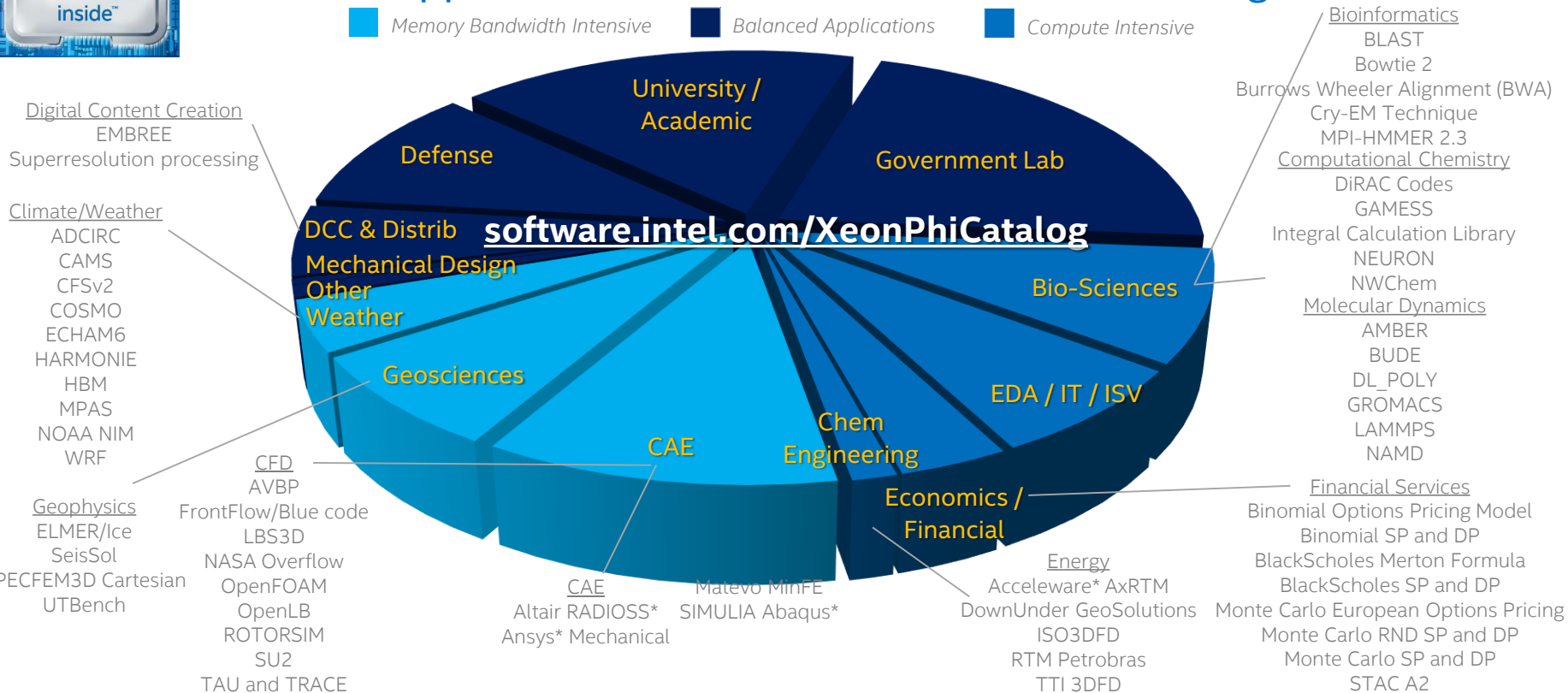




Intel® Xeon Phi™ Application Catalog

Over 100 applications to date listed as available or in-flight

Memory Bandwidth Intensive Balanced Applications Compute Intensive



Source: IDC 2014 (Worldwide High-Performance Systems Revenue by Applications) and <https://software.intel.com/en-us/file/xeonphi-catalogpdf/download>

Intel Confidential



Intel® Xeon Phi™ Product Families – Planning Roadmap



Intel® Xeon Phi™
Coprocessor
(Knights Corner)



Intel® Xeon Phi™
Processor and
Coprocessor x200
(Knights Landing)



	Q2'16	Q3'16	Q4'16	Q1'17	Q2'17
Intel® Xeon Phi™ processor 16GB 8GB 0GB Integrated Intel® Omni-Path Fabric (option) <i>*Reduced OPIO and DDR frequency</i> Intel® Xeon Phi™ coprocessor x200 PCIe Form Factor PASSIVE Thermal Solution PCIe Form Factor ACTIVE Thermal Solution <i>*Reduced OPIO frequency</i>	270W TDP 7120D 61 cores 1.238 GHz 16GB GDDR5 5.5GT/s 16 mem ch 300W TDP 7120X 300W TDP 7120P 300W TDP 7120A 60 cores 1.053 GHz 8GB GDDR5 5.5GT/s 16 mem ch 245W TDP 5120D 300W TDP 3120P 57 cores 1.1 GHz 6GB GDDR5 5.0GT/s 12 mem ch 300W TDP 3120A	7120D 7120X 7120P 7120A 5120D 3120P 3120A	7120D 7120X 7120P 7120A 5120D 3120P 3120A	7120D 7120X 7120P 7120A 5120D 3120P 3120A	PCIe Form Factor PASSIVE Thermal Solution PCIe Form Factor ACTIVE Thermal Solution PCIe Form Factor NO Thermal Solution (NTS) Dense Form Factor NO Thermal Solution Future Product
	245W TDP FBD 7290 72 cores 1.5/1.3 GHz 215W TDP 7250 68 cores 1.4/1.2 GHz 215W TDP 7230 64 cores 1.3/1.1 GHz 215W TDP 7210* 64 cores 1.3/1.1 GHz 215W TDP 5250* 64 cores 1.3/1.1 GHz 215W TDP 3250* 64 cores 1.3/1.1 GHz	FBD 7290 72 cores 1.5/1.3 GHz 7250 68 cores 1.4/1.2 GHz 7230 64 cores 1.3/1.1 GHz 7210* 64 cores 1.3/1.1 GHz 5250* 64 cores 1.3/1.1 GHz 3250* 64 cores 1.3/1.1 GHz	FBD 7290 72 cores 1.5/1.3 GHz 7250 68 cores 1.4/1.2 GHz 7230 64 cores 1.3/1.1 GHz 7210* 64 cores 1.3/1.1 GHz 5250* 64 cores 1.3/1.1 GHz 3250* 64 cores 1.3/1.1 GHz	FBD 7290 72 cores 1.5/1.3 GHz 7250 68 cores 1.4/1.2 GHz 7230 64 cores 1.3/1.1 GHz 7210* 64 cores 1.3/1.1 GHz 5250* 64 cores 1.3/1.1 GHz 3250* 64 cores 1.3/1.1 GHz	FBD 7290 72 cores 1.5/1.3 GHz 7250 68 cores 1.4/1.2 GHz 7230 64 cores 1.3/1.1 GHz 7210* 64 cores 1.3/1.1 GHz 5250* 64 cores 1.3/1.1 GHz 3250* 64 cores 1.3/1.1 GHz
			300W TDP 7240P 68 cores 1.3/1.1 GHz 300W TDP 7220P† 68 cores 1.3/1.1 GHz 300W TDP 7220A† 68 cores 1.3/1.1 GHz 300W TDP 7220A-HS† 68 cores 1.3/1.1 GHz	7240P 68 cores 1.3/1.1 GHz 7220P† 68 cores 1.3/1.1 GHz 7220A† 68 cores 1.3/1.1 GHz 7220A-HS† 68 cores 1.3/1.1 GHz	7240P 68 cores 1.3/1.1 GHz 7220P† 68 cores 1.3/1.1 GHz 7220A† 68 cores 1.3/1.1 GHz 7220A-HS† 68 cores 1.3/1.1 GHz

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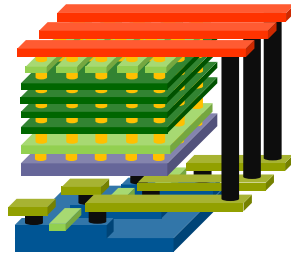
Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Click http://www.intel.com/products/processor_number for details

STORAGE UPDATE

Intel® Solid-State Drive Technology Building Blocks

3D NAND : Cost Focused

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1
5

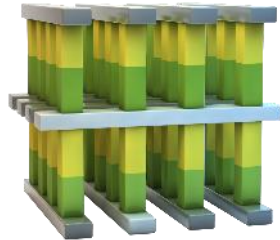


Enabling SSDs into HDD segments

- Traditional Flash in 3D Array
- High Capacity: >10TB SSDs
- Very Competitive Price Points

3D XPoint™ : Performance Focused

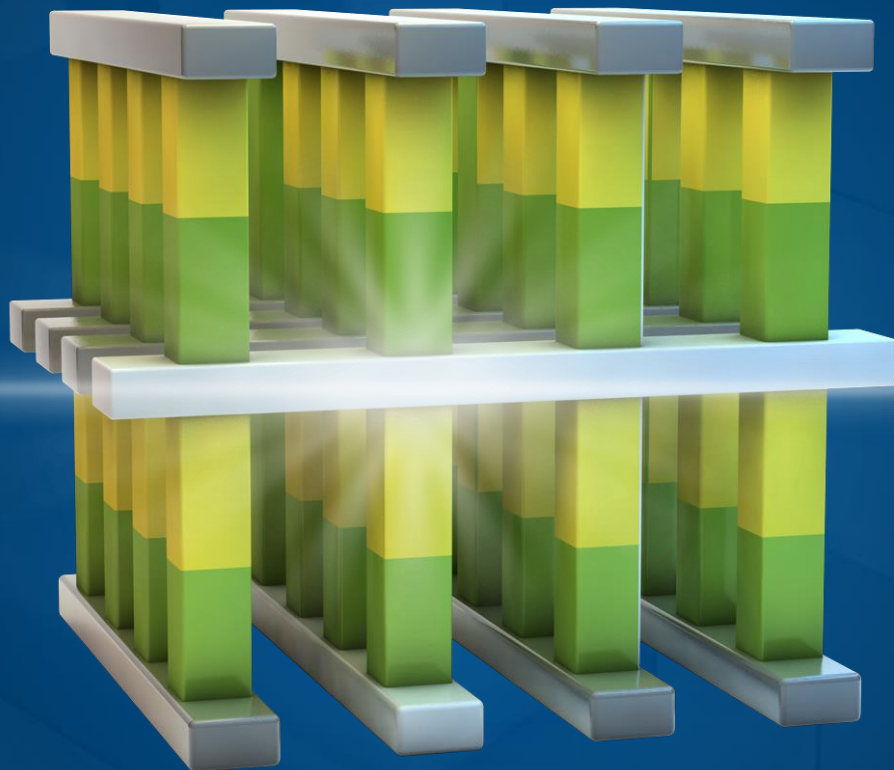
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6



Ultra high performance storage

- New Class of NV Memory
- High Endurance
- Low Latency
- DIMM Replacement Capable

WHAT IS 3D XPOINT™?



Crosspoint Structure

Selectors allow dense packing and individual access to bits

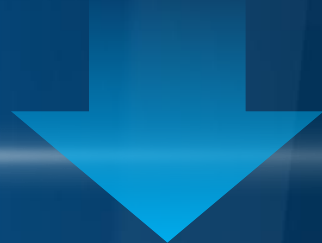


Scalable

Memory layers can be stacked in a 3D manner

Breakthrough Material Advances

Compatible switch and memory cell materials



High Performance

Cell and array architecture that can switch states 1000x faster than NAND

INTEL® OPTANE™ TECHNOLOGY

Unleashing Breakthrough Performance for a New Generation of Computing

Storage. Memory. Converged.

INTEL® OPTANE™
TECHNOLOGY

=

3D XPoint™
Memory Media

+

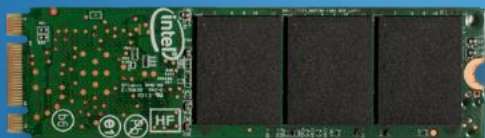
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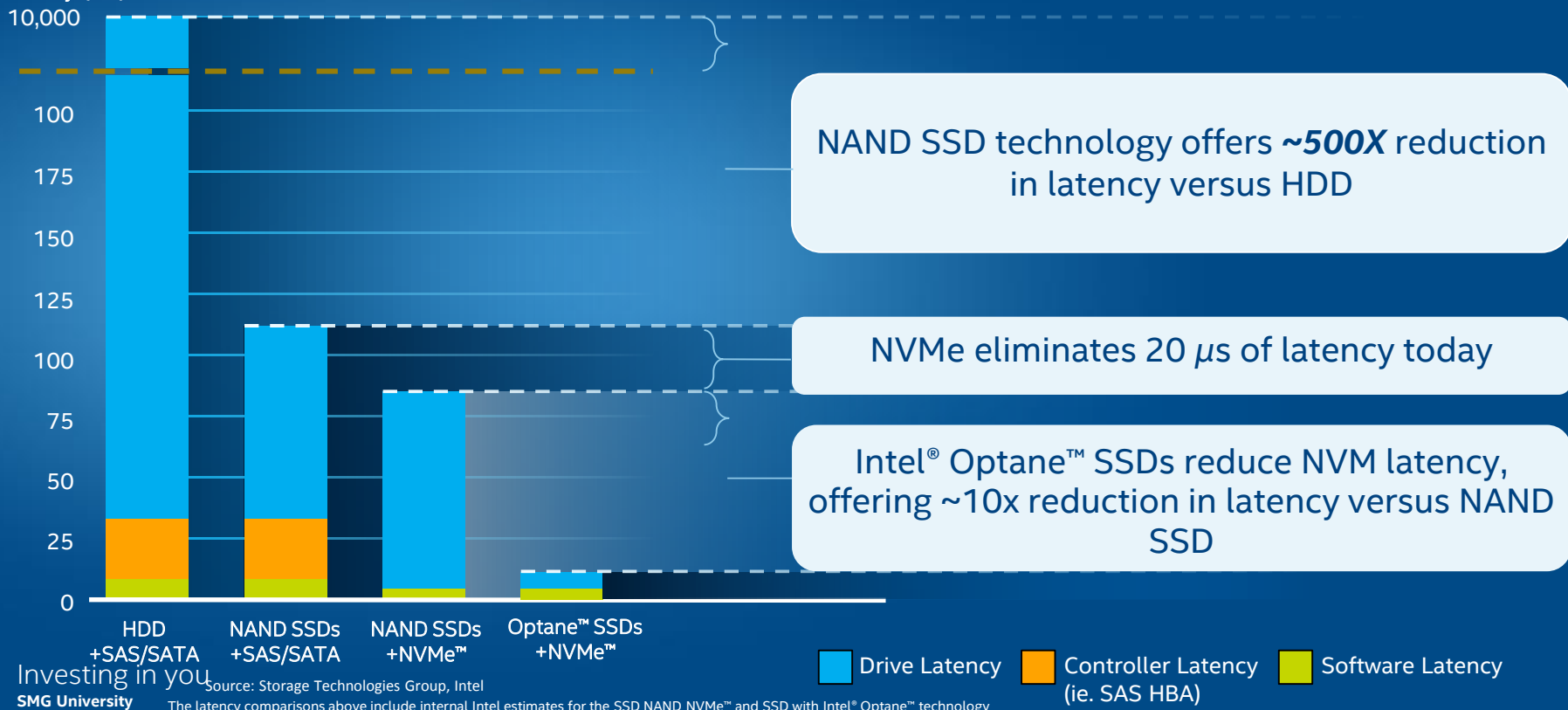
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REFERENCE TABLES



Intel® Xeon Phi™ Product Family x200 Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores /Threads	TDP/AVX Clock Frequency (GHz)	Mesh Frequency (GHz)	Max All/Single Tile Turbo Clock Speed (GHz)	MCDRAM High-Bandwidth Memory (GB)	OPIO On-Package I/O Speed (GT/s)	Supported Memory (6 ch 1 DPM)	Integrated Intel® Omni-Path Fabric
Intel® Xeon Phi™ Processor	Knights Landing/ P1	14nm	7290F	260W	72C288T	1.6/1.5/1.3	1.7	1.7/1.6	16GB	7.2	DDR4 2400	2 ports
			7290	245W	72C288T	1.6/1.5/1.3	1.7	1.7/1.6	16GB	7.2	DDR4 2400	None
			7250F	230W	68C272T	1.5/1.4/1.2	1.7	1.6/1.5	16GB	7.2	DDR4 2400	2 ports
			7250	215W	68C272T	1.5/1.4/1.2	1.7	1.6/1.5	16GB	7.2	DDR4 2400	None
			7230F	230W	64C256T	1.4/1.3/1.1	1.7	1.5/1.4	16GB	7.2	DDR4 2400	2 ports
			7230	215W	64C256T	1.4/1.3/1.1	1.7	1.5/1.4	16GB	7.2	DDR4 2400	None
			7210	215W	64C256T	1.4/1.3/1.1	1.6	1.5/1.4	16GB	6.4	DDR4 2133	None
			5250	215W	64C256T	1.4/1.3/1.1	1.6	1.5/1.4	8GB	6.4	DDR4 2133	None
			3250	215W	64C256T	1.4/1.3/1.1	1.6	1.5/1.4	0GB	6.4	DDR4 2133	None



Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	Form Factor, Thermal	TDP (Watts)	Max # of Cores /Threads	TDP/AVX Clock Frequency (GHz)	Mesh Frequency (GHz)	Enabled Turbo	MCDRAM High-Bandwidth Memory (GB)	OPIO On-Package I/O Speed (GT/s)
Intel® Xeon Phi™ Coprocessor x200	Knights Landing/ P1	14nm	7240P	PCIe Card, Passively Cooled	300W	68C272T	1.3/1.1	1.7	Y	16GB	7.2
			7220P	PCIe Card, Passively Cooled	300W	68C272T	1.2/1.0	1.6	Y	16GB	6.4
			7220A	PCIe Card, Actively Cooled	300W	68C272T	1.2/1.0	1.6	Y	16GB	6.4
			7220A-HS	PCIe Card, ActivelyCooled	300W	68C272T	1.2/1.0	1.6	Y	16GB	6.4

Intel® Xeon Phi™ Coprocessor x100 Family Reference Table

Processor Brand Name	Codename	SKU #	Form Factor, Thermal	Board TDP (Watts)	Max # of Cores	Clock Speed (GHz)	Peak Double Precision (GFLOP)	GDDR5 Memory Speeds (GT/s)	Peak Memory BW	Memory Capacity (GB)	Total Cache (MB)	Enabled Turbo	Turbo Clock Speed (GHz)	Recommended Customer Pricing (RCP)
 Intel® Xeon Phi™ coprocessor x100	Knights Corner	7120D	PCle Dense FF, No Thermal Solution	270	61	1.238	1208	5.5	352	16	30.5	Y	1.333	\$4235
		7120A	PCle Card Actively Cooled	300	61	1.238	1208	5.5	352	16	30.5	Y	1.333	\$4235
		7120P	PCle Card, Passively Cooled	300	61	1.238	1208	5.5	352	16	30.5	Y	1.333	\$4129
		7120X	PCle Card, No Thermal Solution	300	61	1.238	1208	5.5	352	16	30.5	Y	1.333	\$4129
		5120D	PCle Dense FF, No Thermal Solution	245	60	1.053	1011	5.5	352	8	30	N	N/A	\$2759
		5110P	PCle Card Passively Cooled	225	60	1.053	1011	5.0	320	8	30	N	N/A	\$2649
		5110PKIT *	PCle Card, Passively Cooled	225	60	1.053	1011	5.0	320	8	30	N	N/A	\$2437
		3120P	PCle Card Passively Cooled	300	57	1.1	1003	5.0	240	6	28.5	N	N/A	\$1695
		3120A	PCle Card Actively Cooled	300	57	1.1	1003	5.0	240	6	28.5	N	N/A	\$1695
		3120AKIT *	PCle Card Actively Cooled	300	57	1.1	1003	5.0	240	6	28.5	N	N/A	\$1960


*Available as part of a Xeon Phi™ starter kit only. Please see the [Intel Xeon Phi™ Starter Kit Program \(CDI doc# 539389\)](http://software.intel.com/en-us/xeon-phi-starter-kit) for SKU details, and <http://software.intel.com/en-us/xeon-phi-starter-kit> for OEMs offering the Starter Kits.

WW17 Intel® Itanium® Processor 9500/9300 Series Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Processors	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Last Level Cache Size (MB)	Intel® QPI Speed (GT/s)	Supported Memory Speeds	Intel Capabilities				
										Intel® Instruction Replay Technology	Intel® Cache Safe Technology	Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology*	Intel® VT
 Intel® Itanium® processor 9500 series	Poulson / LGA1248	32nm	9560	170	8/16	2.53	32	6.4	DDR3-1066	✓	✓	✓	✓	✓
			9550	170	4/8	2.4	32	6.4	DDR3-1066	✓	✓	✓	✓	✓
			9540	170	8/16	2.13	24	6.4	DDR3-1066	✓	✓	✓	✓	✓
			9520	170	4/8	1.73	20	6.4	DDR3-1066	✓	✓	✓	✓	✓
 Intel® Itanium® processor 9300 series	Tukwila-MC/ LGA1248	65nm	9350	185	4/8	1.73	24	4.8	DDR3-800	-	✓	✓	✓	✓
			9340	185	4/8	1.60	20	4.8	DDR3-800	-	✓	✓	✓	✓
			9330	155	4/8	1.46	20	4.8	DDR3-800	-	✓	✓	✓	✓
			9320	155	4/8	1.33	16	4.8	DDR3-800	-	✓	✓	✓	✓
			9310	130	2/4	1.60	10	4.8	DDR3-800	-	✓	✓	-	✓


* Intel Itanium processor 9500 series delivers Intel Turbo Boost Technology, featuring sustained boost.

WW17 Intel® Xeon® Processor E7-8800/4800 v3 Product Families Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Max Supported DDR4 Memory Speed -MHz (Performance / Lockstep)	Max Supported DDR3 Memory Speed -MHz (Performance / Lockstep)	Intel Capabilities ²					
													Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT	Intel® TSX
Intel® Xeon® processor 	Haswell-EX/ LGA2011-1	22nm	E7-8893 v3	140	4/8	3.2	3.3	3.5	45M	9.6	3200/1866	3200/1600	✓	✓	✓	✓	✓	✓
			E7-8891 v3	165	10/20	2.8	3.2	3.5	45M	9.6	3200/1866	3200/1600	✓	✓	✓	✓	✓	✓
			E7-8890 v3	165	18/36	2.5	2.9	3.3	45M	9.6	3200/1866	3200/1600	✓	✓	✓	✓	✓	✓
			E7-8880 v3	150	18/36	2.3	2.7	3.3	45M	9.6	3200/1866	3200/1600	✓	✓	✓	✓	✓	✓
			E7-8880L v3	115	18/36	2.0	2.3	2.8	45M	9.6	3200/1866	3200/1600	✓	✓	✓	✓	✓	✓
			E7-8870 v3	140	18/36	2.1	2.5	2.9	45M	9.6	3200/1866	3200/1600	✓	✓	✓	✓	✓	✓
			E7-8867 v3	165	16/32	2.5	2.7	3.3	45M	9.6	3200/1866	3200/1600	✓	✓	✓	✓	✓	✓
			E7-8860 v3	140	16/32	2.2	2.6	3.2	40M	9.6	3200/1866	3200/1600	-	✓	✓	✓	✓	✓
			E7-4850 v3	115	14/28	2.2	2.5	2.8	35M	8	2666/1866	2666/1600	✓	✓	✓	✓	✓	✓
			E7-4830 v3	115	12/24	2.1	2.4	2.7	30M	8	2666/1866	2666/1600	✓	✓	✓	✓	✓	✓
			E7-4820 v3	115	10/20	1.9	-	-	25M	6.4	2666/1866	2666/1333	✓	-	✓	✓	✓	✓
			E7-4809 v3	115	8/16	2.0	-	-	20M	6.4	2666/1866	2666/1333	✓	-	✓	✓	✓	✓


WW17 Intel® Xeon® Processor E7-8800/4800/2800 v2 Product Families Reference Table

No Change

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Max Supported DDR3 Memory Speed -MHz (Performance/ Lockstep)	Intel Capabilities ²				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
 Intel® Xeon® processor	Ivy Bridge-EX/ LGA2011-1	22nm	E7-8893	155	6/12	3.4	3.5	3.7	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-8891	155	10/20	3.2	3.4	3.7	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-8890	155	15/30	2.8	3.2	3.8	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-8880	130	15/30	2.5	2.9	3.5	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-8870	130	15/30	2.3	2.7	3.3	30M	8	2666/1600	✓	✓	✓	✓	✓
			E7-8850	105	12/24	2.3	2.6	3.1	24M	7.2	2132/1600	✓	✓	✓	✓	✓
			E7-8880L	105	15/30	2.2	2.6	3.2	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-8857	130	12/12	3.0	3.4	3.6	30M	8	2666/1600	-	✓	✓	✓	✓
			E7-4890	155	15/30	2.8	3.2	3.8	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-4880	130	15/30	2.5	2.9	3.5	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-4870	130	15/30	2.3	2.7	3.3	30M	8	2666/1600	✓	✓	✓	✓	✓
			E7-4860	130	12/24	2.6	3.0	3.2	30M	8	2666/1600	✓	✓	✓	✓	✓
			E7-4850	105	12/24	2.3	2.6	2.8	24M	7.2	2132/1600	✓	✓	✓	✓	✓
			E7-4830	105	10/20	2.2	2.5	2.7	20M	7.2	2132/1600	✓	✓	✓	✓	✓
			E7-4820	105	8/16	2.0	2.3	2.5	16M	7.2	2132/1600	✓	✓	✓	✓	✓
			E7-4809	105	6/12	1.9	N/A	N/A	12M	6.4	2132/1333	✓	-	✓	✓	✓
			E7-2890	155	15/30	2.8	3.2	3.8	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-2880	130	15/30	2.5	2.9	3.5	37.5M	8	2666/1600	✓	✓	✓	✓	✓
			E7-2870	130	15/30	2.3	2.7	3.3	30M	8	2666/1600	✓	✓	✓	✓	✓
			E7-2850	105	12/24	2.3	2.6	3.1	24M	7.2	2132/1600	✓	✓	✓	✓	✓

WW17 Intel® Xeon® Processor E7-8800/4800/2800 Product Families Reference Table

No Change

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Max Supported DDR3 Memory Speed (MHz)	Intel Capabilities ²				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
 Intel® Xeon® processor	Westmere-EX/ LGA1567	32nm	E7-8870	130	10/20	2.4	2.53	2.8	30MB	6.4	1066	✓	✓	✓	✓	✓
			E7-8860	130	10/20	2.26	2.4	2.66	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-8850	130	10/20	2	2.13	2.4	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-8830	105	8/16	2.13	2.26	2.4	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-8867L	105	10/20	2.13	2.26	2.53	30MB	6.4	1066	✓	✓	✓	✓	✓
			E7-8837	130	8/8	2.67	2.8	2.8	24MB	6.4	1066	-	✓	✓	✓	✓
			E7-4870	130	10/20	2.4	2.53	2.8	30MB	6.4	1066	✓	✓	✓	✓	✓
			E7-4860	130	10/20	2.26	2.4	2.66	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-4850	130	10/20	2	2.13	2.4	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-4830	105	8/16	2.13	2.26	2.4	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-4820	105	8/16	2	2.13	2.26	18MB	5.86	978 ¹	✓	✓	✓	✓	✓
			E7-4807	95	6/12	1.86	-	-	18MB	4.8	800 ¹	✓	-	✓	✓	✓
			E7-2870	130	10/20	2.4	2.53	2.8	30MB	6.4	1066	✓	✓	✓	✓	✓
			E7-2860	130	10/20	2.26	2.4	2.66	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-2850	130	10/20	2	2.13	2.4	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-2830	105	8/16	2.13	2.26	2.4	24MB	6.4	1066	✓	✓	✓	✓	✓
			E7-2820	105	8/16	2	2.13	2.26	18MB	5.86	978 ¹	✓	✓	✓	✓	✓
			E7-2803	105	6/12	1.73	-	-	18MB	4.8	800 ¹	✓	-	✓	✓	✓


¹ 1066 MHz DIMMs run at an effective frequency of 978 MHz when run at 5.86GHz Intel® SMI speed & 800MHz when run at 4.8 GHz Intel SMI speed


² The package for all Intel® Xeon® processor E7-8800/4800/2800 product family SKUs is lead-free and halogen-free

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WW17 Intel® Xeon® Processor E5-4600 v3 Product Family Reference Table

Processor Brand Name	Processor Codename / Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR4 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor 	Haswell-EP 4S/ LGA2011	22 nm	E5-4669 v3	135	18/36	2.1	2.4	2.9	45M	9.6	2133	✓	✓	✓	✓	✓
			E5-4667 v3	135	16/32	2.0	2.3	2.9	40M	9.6	2133	✓	✓	✓	✓	✓
			E5-4660 v3	120	14/28	2.1	2.4	2.9	35M	9.6	2133	✓	✓	✓	✓	✓
			E5-4655 v3	135	6/12	2.9	3.0	3.2	30M	9.6	2133	✓	✓	✓	✓	✓
			E5-4650 v3	105	12/24	2.1	2.4	2.8	30M	9.6	2133	✓	✓	✓	✓	✓
			E5-4640 v3	105	12/24	1.9	2.1	2.6	30M	8.0	1866	✓	✓	✓	✓	✓
			E5-4627 v3	135	10/20	2.6	3.0	3.2	25M	8.0	2133	-	✓	✓	✓	✓
			E5-4620 v3	105	10/20	2.0	2.2	2.6	25M	8.0	1866	✓	✓	✓	✓	✓
			E5-4610 v3	105	10/20	1.7	---	---	25M	6.4	1600	✓	-	✓	✓	✓


Processor Brand Name	Process or Codename/Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
 Intel® Xeon® processor	Ivy Bridge-EP 4S/LGA2011	22 nm	E5-4657L v2	115	12/24	2.4	2.7	2.9	30M	8	1866	✓	✓	✓	✓	✓
			E5-4650 v2	95	10/20	2.4	2.7	2.9	25M	8	1866	✓	✓	✓	✓	✓
			E5-4640 v2	95	10/20	2.2	2.5	2.7	20M	8	1866	✓	✓	✓	✓	✓
			E5-4627 v2	130	8/16	3.3	3.5	3.6	16M	7.2	1866	-	✓	✓	✓	✓
			E5-4620 v2	95	8/16	2.6	2.8	3.0	20M	7.2	1600	✓	✓	✓	✓	✓
			E5-4610 v2	95	8/16	2.3	2.5	2.7	16M	7.2	1600	✓	✓	✓	✓	✓
			E5-4607 v2	95	6/12	2.6	---	---	15M	6.4	1333	✓	-	✓	✓	✓
			E5-4603 v2	95	4/8	2.2	---	---	10M	6.4	1333	✓	-	✓	✓	✓

WW17 Intel® Xeon® Processor E5-4600 Product Family Reference Table

Processor Brand Name	Processor Codename/Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor 	Sandy Bridge-EP 45/LGA2011	32 nm	E5-4650	130W	8/16	2.7	2.9	3.3	20MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-4650L	115W	8/16	2.6	2.8	3.1	20MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-4640	95W	8/16	2.4	2.5	2.8	20MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-4620	95W	8/16	2.2	2.3	2.6	16MB	7.2	1333/1066/800	✓	✓	✓	✓	✓
			E5-4617	130W	6/6	2.9	3.2	3.4	15MB	7.2	1600/1333/1066/800	–	✓	✓	✓	✓
			E5-4610	95W	6/12	2.4	2.7	2.9	15MB	7.2	1333/1066/800	✓	✓	✓	✓	✓
			E5-4607	95W	6/12	2.2	–	–	12MB	6.4	1066/800	✓	–	✓	✓	✓
			E5-4603	95W	4/8	2.0	–	–	10MB	6.4	1066/800	✓	–	✓	✓	✓


Note: Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Over time processor numbers will increment based on changes in clock speed, cache, FSB, or other features, and increments are not intended to represent proportional or quantitative increases in any particular feature. Current roadmap processor number progression is not necessarily representative of future roadmaps. See WWW.intel.com/products/processor_number for details.

WW17 Intel® Xeon® Processor E5-2600 v4 Product Family Reference Table

Processor Brand Name	Processor Codename / Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR4 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel AES-NI	Intel® VT
 Intel® Xeon® processor	Broadwell -EP/ LGA2011	14 nm	E5-2699v4	145W	22/44	2.2	2.8	3.6	55MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2698v4	135W	20/40	2.2	2.7	3.6	50MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2697v4	145W	18/36	2.3	2.8	3.6	45MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2697Av4	145W	16/32	2.6	3.1	3.6	40MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2695v4	120W	18/36	2.1	2.6	3.3	45MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2690v4	135W	14/28	2.6	3.2	3.5	35MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2689v4	165W	10/20	3.1	3.7	3.8	25MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2687Wv4	160W	12/24	3.000	3.2	3.5	30MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2683v4	120W	16/32	2.1	2.6	3	40MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2680v4	120W	14/28	2.4	2.9	3.3	35MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2667v4	135W	8/16	3.2	3.5	3.6	25MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2660v4	105W	14/28	2.000	2.4	3.2	35MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2650v4	105W	12/24	2.2	2.5	2.9	30MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2650Lv4	65W	14/28	1.7	2.000	2.5	35MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2643v4	135W	6/12	3.4	3.6	3.7	20MB	9.6	2400/2133/1866/1600	✓	✓	✓	✓	✓
			E5-2640v4	90W	10/20	2.4	2.6	3.4	25MB	8	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2637v4	135W	4/8	3.5	3.6	3.7	15MB	9.6	2400/2133/1866/1614	✓	✓	✓	✓	✓
			E5-2630v4	85W	10/20	2.2	2.4	3.1	25MB	8	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2630Lv4	55W	10/20	1.8	2.000	2.9	25MB	8	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2623v4	85W	4/8	2.6	2.8	3.2	10MB	8	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2620v4	85W	8/16	2.1	2.3	3	20MB	8	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2609v4	85W	8/8	1.7	1.7	1.7	20MB	6.4	1866/1600	-	-	✓	✓	✓
			E5-2603v4	85W	6/6	1.7	1.7	1.7	15MB	6.4	1866/1600	-	-	✓	✓	✓


- 1 Workstation only SKU
- 2 All E5-2600 v4 SKUs are lead-free and halogen free

WW17 Intel® Xeon® Processor E5-2600 v3 Product Family Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR4 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel AES-NI	Intel® VT
 Intel® Xeon® processor	Haswell-EP/ LGA2011	22 nm	E5-2699 v3	145W	18/36	2.3	2.8	3.6	45MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2698 v3	135W	16/32	2.3	2.8	3.6	40MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2697 v3	145W	14/28	2.6	3.1	3.6	35MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2695 v3	120W	14/28	2.3	2.6	3.0	35MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2690 v3	135W	12/24	2.6	3.1	3.5	30MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2687W ¹ v3	160W	10/20	3.1	3.2	3.5	25MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2683 v3	120W	14/28	2.0	2.5	3.0	35MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2680 v3	120W	12/24	2.5	2.9	3.3	30MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2670 v3	120W	12/24	2.3	2.6	3.1	30MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2667 v3	135W	8/16	3.2	3.4	3.6	20MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2660 v3	105W	10/20	2.6	2.9	3.3	25MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2650 v3	105W	10/20	2.3	3.6	3.0	25MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2650L v3	65W	12/24	1.8	2.1	2.5	30MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2643 v3	134W	6/12	3.4	3.6	3.7	20MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2640 v3	90W	8/16	2.6	2.8	3.4	20MB	8.0	1866/1600	✓	✓	✓	✓	✓
			E5-2637 v3	135W	4/8	3.5	3.6	3.7	15MB	9.6	2133/1866/1600	✓	✓	✓	✓	✓
			E5-2630 v3	85W	8/16	2.4	2.6	3.2	15MB	8.0	1866/1600	✓	✓	✓	✓	✓
			E5-2630L v3	55W	8/16	1.8	2.1	2.9	20MB	8.0	1866/1600	✓	✓	✓	✓	✓
			E5-2620 v3	85W	6/12	2.4	2.6	3.2	15MB	8.0	1866/1600	✓	✓	✓	✓	✓
			E5-2623 v3	105W	4/8	3.0	3.3	3.5	15MB	8.0	1866/1600	✓	✓	✓	✓	✓
			E5-2609 v3	85W	6/6	1.9	-	-	15MB	6.4	1600	-	-	✓	✓	✓
			E5-2603 v3	85W	6/6	1.6	-	-	15MB	6.4	1600	-	-	✓	✓	✓


- 1 Workstation only SKU
- 2 All E5-2600 v3 SKUs are lead-free and halogen free

WW17 Intel® Xeon® Processor E5-2600 v2 Product Family Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
 Intel® Xeon® processor	Ivy Bridge-EP/ LGA2011	22 nm	E5-2697 v2	130W	12/24	2.7	3.0	3.5	30MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2695 v2	130W	12/24	2.4	2.8	3.2	30MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2690 v2	130W	10/20	3.0	3.3	3.6	25MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2687W ¹ v2	150W	8/16	3.4	3.6	4.0	25MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2680 v2	115W	10/20	2.8	3.1	3.6	25MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2670 v2	115W	10/20	2.5	2.9	3.3	25MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2667 v2	130W	8/16	3.3	3.6	4.0	25MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2660 v2	95W	10/20	2.2	2.6	3.0	25MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2650 v2	95W	8/16	2.6	3.0	3.4	20MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2650L v2	70W	10/20	1.7	1.9	2.1	25MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2643 v2	130W	6/12	3.5	3.4	3.8	25MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2640 v2	95W	8/16	2.0	2.3	2.5	20MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2637 v2	130W	4/8	3.5	3.6	3.8	15MB	8.0	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2630 v2	80W	6/12	2.6	2.9	3.1	15MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2630L v2	60W	6/12	2.4	2.6	2.8	15MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2620 v2	80W	6/12	2.1	2.4	2.6	15MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2609 v2	80W	4/4	2.5	-	-	10MB	6.4	1333/1066/800	-	-	✓	✓	✓
			E5-2603 v2	80W	4/4	1.8	-	-	10MB	6.4	1333/1066/800	-	-	✓	✓	✓


- 1 Workstation only SKU
- 2 All E5-2600 v2 SKUs are lead-free and halogen free

WW17 Intel® Xeon® Processor E5-1600 v3 Product Family (for 1S Workstations) Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
 Intel® Xeon® processor	Haswell-EP/ LGA2011	22 nm	E5-1680 v3	140W	8/16	3.2	3.5	3.8	20MB	-	2133/1866/1600	✓	✓	✓	✓	✓
			E5-1660 v3	140W	8/16	3.0	3.3	3.5	20MB	-	2133/1866/1600	✓	✓	✓	✓	✓
			E5-1650 v3	140W	6/12	3.5	3.6	3.8	15MB	-	2133/1866/1600	✓	✓	✓	✓	✓
			E5-1630 v3	140W	4/8	3.7	3.8	3.8	10MB	-	2133/1866/1600	✓	✓	✓	✓	✓
			E5-1620 v3	140W	4/8	3.5	3.6	3.6	10MB	-	2133/1866/1600	✓	✓	✓	✓	✓

- 1 All E5-1600 v3 are workstation only SKUs
- 2 All E5-1600 v3 SKUs are lead-free and halogen free

WW17 Intel® Xeon® Processor E5-1600 v2 Product Family (for 1S Workstations) Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel AES-NI	Intel® VT
 Intel® Xeon® processor	Ivy Bridge-EP/ LGA2011	22 nm	E5-1660 v2	130W	6/12	3.7	3.9	4.0	15MB	-	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-1650 v2	130W	6/12	3.5	3.6	3.9	15MB	-	1866/1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-1620 v2	130W	4/8	3.7	3.7	3.9	10MB	-	1866/1600/1333/1066/800	✓	✓	✓	✓	✓


- 1 All E5-1600 v2 are workstation only SKUs
- 2 All E5-1600 v2 SKUs are lead-free and halogen free

WW17 Intel® Xeon® Processor E5-1600 Product Family (for 1S Workstations) Reference Table

Processor Brand Name	Processor Codename / Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor	Sandy Bridge-WS/ LGA2011	32nm	E5-1660	130W	6/12	3.30	3.6	3.9	15MB	-	1600/1333/1066	✓	✓	✓	✓	✓
			E5-1650	130W	6/12	3.20	3.6	3.8	12MB	-	1600/1333/1066	✓	✓	✓	✓	✓
			E5-1620	130W	4/8	3.60	3.7	3.8	10MB	-	1600/1333/1066	✓	✓	✓	✓	✓




WW17 Intel® Xeon® Processor E5-2400 v2 Product Family Reference Table

Processor Brand Name	Processor Codename / Socket Type	Proce ss	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel AES-NI	Intel® VT
Intel® Xeon® processor 	Ivy Bridge-EN/ LGA135 6-2	22 nm	E5-2470 v2	95W	10/20	2.4	2.8	3.2	25MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2450 v2	95W	8/16	2.5	2.9	3.3	20MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2450L v2	60W	10/20	1.7	1.9	2.1	25MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2440 v2	95W	8/16	1.9	2.2	2.4	20MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2430 v2	80W	6/12	2.5	2.8	3.0	15MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2430L v2	60W	6/12	2.4	2.6	2.8	15MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2420 v2	80W	6/12	2.2	2.5	2.7	15MB	7.2	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2407 v2	80W	4/4	2.4	-	-	10MB	6.4	1333/1066/800	-	-	✓	✓	✓
			E5-2403 v2	80W	4/4	1.8	-	-	10MB	6.4	1333/1066/800	-	-	✓	✓	✓


All E5-2400 SKUs are lead free and halogen free

WW17 Intel® Xeon® Processor E5-2400 Product Family Reference Table

Processor Brand Name	Processor Codename / Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Intel® QPI Speed (GT/s)	Supported Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel AES-NI	Intel® VT
Intel® Xeon® processor 	Sandy Bridge-EN/ LGA1356	32 nm	E5-2470	95W	8/16	2.3	2.8	3.1	20MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2450	95W	8/16	2.1	2.6	2.9	20MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2450L	70W	8/16	1.8	2.0	2.3	20MB	8.0	1600/1333/1066/800	✓	✓	✓	✓	✓
			E5-2440	95W	6/12	2.4	2.7	2.9	15MB	7.2	1333/1066/800	✓	✓	✓	✓	✓
			E5-2430	95W	6/12	2.2	2.5	2.7	15MB	7.2	1333/1066/800	✓	✓	✓	✓	✓
			E5-2430L	60W	6/12	2.0	2.3	2.5	15MB	7.2	1333/1066/800	✓	✓	✓	✓	✓
			E5-2420	95W	6/12	1.9	2.2	2.4	15MB	7.2	1333/1066/800	✓	✓	✓	✓	✓
			E5-2407	80W	4/4	2.2	-	-	10MB	6.4	1066/800	-	-	✓	✓	✓
			E5-2403	80W	4/4	1.8	-	-	10MB	6.4	1066/800	-	-	✓	✓	✓

All E5-2400 SKUs are lead free and halogen free

WW17 Intel® Xeon® Processor E3-1200 v5 Product Family Reference Table


Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	# of Internal Graphics Engines (GT)	Supported DDR4 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor 	Skylake/ LGA1151	14nm	E3-1280 v5	80W	4C8T	3.7	3.7	4.0	8MB	0	2133	✓	✓	✓	✓	✓
			E3-1275 v5	80W	4C8T	3.6	3.7	4.0	8MB	2	2133	✓	✓	✓	✓	✓
			E3-1270 v5	80W	4C8T	3.6	3.7	4.0	8MB	0	2133	✓	✓	✓	✓	✓
			E3-1260L v5	45W	4C8T	2.9	3.6	3.9	8MB	0	2133	✓	✓	✓	✓	✓
			E3-1245 v5	80W	4C8T	3.5	3.6	3.9	8MB	2	2133	✓	✓	✓	✓	✓
			E3-1240 v5	80W	4C8T	3.5	3.7	3.9	8MB	0	2133	✓	✓	✓	✓	✓
			E3-1240L v5	25W	4C8T	2.1	2.9	3.2	8MB	0	2133	✓	✓	✓	✓	✓
			E3-1235L v5	25W	4C4T	2.0	2.7	3.0	4MB	2	2133	-	✓	✓	✓	✓
			E3-1230 v5	80W	4C8T	3.4	3.6	3.8	8MB	0	2133	✓	✓	✓	✓	✓
			E3-1225 v5	80W	4C4T	3.3	3.4	3.7	8MB	2	2133	-	✓	✓	✓	✓
			E3-1220 v5	80W	4C4T	3.0	3.3	3.5	8MB	0	2133	-	✓	✓	✓	✓

All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice.

Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families.

Optimized Intel® Iris™ Pro Graphics P6300 only available on select models of the Intel® Xeon® processor E3 family. To learn more about Intel Xeon processors for workstation visit www.intel.com/go/workstation

WW17 Intel® Xeon® Processor E3-1200 v4 Product Family Reference Table


Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	# of Internal Graphics Engines (GT)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor 	Broadwell / LGA1150	14nm	E3-1285 v4	95W	4C8T	3.5	3.6	3.8	6MB	3	1866	✓	✓	✓	✓	✓
			E3-1285L v4	65W	4C8T	3.4	3.7	3.8	6MB	3	1866	✓	✓	✓	✓	✓
			E3-1265L v4	35W	4C8T	2.3	3.1	3.3	6MB	3	1866	✓	✓	✓	✓	✓

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Optimized Intel® HD Graphics P3000 only available on select models of the Intel® Xeon® processor E3 family. To learn more about Intel Xeon processors for workstation visit www.intel.com/go/workstation

WW17 Intel® Xeon® Processor E3-1200 v3 Product Family Reference Table


Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	# of Internal Graphics Engines (GT)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor 	Haswell/ LGA1150	22nm	E3-1280 v3	82W	4C8T	3.6	3.8	4	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1270 v3	80W	4C8T	3.5	3.7	3.9	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1265L v3	45W	4C8T	2.5	3.1	3.7	8MB	1	1600	✓	✓	✓	✓	✓
			E3-1240 v3	80W	4C8T	3.4	3.6	3.8	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1230 v3	80W	4C8T	3.3	3.5	3.7	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1220 v3	80W	4C4T	3.1	3.3	3.5	8MB	0	1600	-	✓	✓	✓	✓
			E3-1230L v3	25W	2C4T	1.8	2.3	2.8	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1220L v3	13W	2C4T	1.1	1.3	1.5	4MB	0	1600	✓	✓	✓	✓	✓
			E3-1275 v3	84W	4C8T	3.5	3.6	3.3	8MB	2	1600	✓	✓	✓	✓	✓
			E3-1245 v3	84W	4C8T	3.4	3.6	3.8	8MB	2	1600	✓	✓	✓	✓	✓
			E3-1225 v3	84W	4C4T	3.2	3.4	3.6	8MB	2	1600	-	✓	✓	✓	✓
			E3-1285 v3	84W	4C8T	3.6	3.8	4	8MB	2	1600	✓	✓	✓	✓	✓
			E3-1285L v3	65W	4C8T	3.1	3.5	3.9	8MB	2	1600	✓	✓	✓	✓	✓

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WW17 Intel® Xeon® Processor E3-1200 v3 Product Family (Haswell Refresh) Reference Table


Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores/ Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	# of Internal Graphics Engines (GT)	Supported DDR3 Memory Speeds	Intel Capabilities				
												Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor 	Haswell/ LGA1150	22nm	E3-1281 v3	82W	4C8T	3.7	3.9	4.1	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1271 v3	80W	4C8T	3.6	3.8	4.0	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1275L v3	45W	4C8T	2.7	3.3	3.9	8MB	1	1600	✓	✓	✓	✓	✓
			E3-1241 v3	80W	4C8T	3.5	3.7	3.9	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1231 v3	80W	4C8T	3.4	3.6	3.8	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1240L v3	25W	4C8T	2.0	2.8	3.0	8MB	0	1600	✓	✓	✓	✓	✓
			E3-1276 v3	84W	4C8T	3.6	3.8	4.0	8MB	2	1600	✓	✓	✓	✓	✓
			E3-1246 v3	84W	4C8T	3.5	3.7	3.9	8MB	2	1600	✓	✓	✓	✓	✓
			E3-1226 v3	84W	4C4T	3.3	3.5	3.7	8MB	2	1600	-	✓	✓	✓	✓
			E3-1286 v3	84W	4C8T	3.7	3.9	4.1	8MB	2	1600	✓	✓	✓	✓	✓
			E3-1286L v3	65W	4C8T	3.2	3.6	4.0	8MB	2	1600	✓	✓	✓	✓	✓

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Optimized Intel® HD Graphics P4600 only available on select models of the Intel® Xeon® processor E3 family. To learn more about Intel Xeon processors for workstation visit www.intel.com/go/workstation

WW17 Intel® Xeon® Processor D-1500 Product Family (Broadwell-DE) Reference Table

Processor Brand Name	Processor Codename/ Socket Type	Process	Processor Number	TDP (Watts)	Max # of Cores /Threads	Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	# of Internal Graphics Engines (GT)	Supported Memory	Intel Capabilities				
											Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
Intel® Xeon® processor 	Broadwell-DE/ FCBGA13	14nm	D-1540	45W	8C16T	2	2.6	12MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1520	45W	4C8T	2.2	2.6	6MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1571	45W	16C32T	1.3	2.1	24MB	0	DDR4 2400	✓	✓	✓	✓	✓
			D-1577	45W	16C32T	1.3	2.1	24MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1567	65W	12C24T	2.1	2.7	18MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1557	45W	12C24T	1.5	2.1	12GB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1559	45W	12C24T	1.5	2.1	18MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1541	45W	8C16T	2.1	2.7	12MB	0	DDR4 2400	✓	✓	✓	✓	✓
			D-1521	45W	4C8T	2.4	2.7	6MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1531	45W	6C12T	2.2	2.7	9MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1539	35W	8C16T	1.6	2.2	12MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1548	45W	8C16T	2.0	2.6	12MB	0	DDR4 2400	✓	✓	✓	✓	✓
			D-1527	35W	4C8T	2.2	2.7	6MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1528	35W	6C12T	1.9	2.5	9MB	0	DDR4 2133	✓	✓	✓	✓	✓
			D-1518	35W	4C8T	2.2	2.2	6MB	0	DDR4 2133	✓	-	✓	✓	✓
			D-1537	35W	8C16T	1.7	2.3	12MB	0	DDR4 2133	✓	✓	✓	✓	✓

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WW17 Intel® Atom™ Processor C2000 Series Reference Table

Processor Brand Name	Processor Codename/Socket Type	Processors	Processor Number	TDP (Watts)	Max # of Cores/Threads	Clock Speed (GHz)	Max. All Core Turbo Clock Speed (GHz)	Max. Single Core Turbo Clock Speed (GHz)	Last Level Cache Size	Supported DDR3 Memory Speeds	Intel Capabilities				
											Intel® Hyper-Threading Technology	Intel® Turbo Boost Technology	Intel® TXT	Intel® AES-NI	Intel® VT
 Intel® Atom™ processor	Avoton /FCBGA11	22nm	C2750	20	8/8	2.4	2.6	2.6	4M	1600	-	✓	-	-	✓
			C2730	12	8/8	1.7	2.0	2.4	4M	1333	-	✓	-	-	✓
			C2550	14	4/4	2.4	2.6	2.6	2M	1600	-	✓	-	-	✓
			C2530	9	4/4	1.7	2.0	2.4	2M	1333	-	✓	-	-	✓
			C2350	6	2/2	1.7	2.0	2.4	1M	1333	-	✓	-	-	✓

WW17 Enterprise Platform/Chipset Feature Set Reference Table

Chipset	Processor Series/ Family	# CPUs	Max QPI Speed (GT/s)	Bus Speed (MHz)	Memory					I/O			Storage	Graphics	Intel Technologies
					Type	# DIMM	Max Capacity	Density	ECC/ Parity	64/32b PCI	64b PCI-X	PCI-E			
Intel® E8870	Intel Itanium processor 9000, 9100	1-4 4-16 w/SPS +NC support		400	DDR 200	32 (4S) 128 (16S)	128GB (4S) 512GB (16S)	1Gb	✓	✓	✓		ATA100		
Intel® 7500	Intel Itanium® processor 9500, 9300 series Intel Xeon® processor 7500 series	1-8 + NC support	6.4	N/A	DDR3-RDIMM	64 (4S)	1TB (4 socket)	1Gb 2Gb	✓	✓	N/A	2 –x16* Gen 2 1 –x4 Gen2 (Per IOH) 1 –x4 Gen1 (ICH) *Can be bifurcated	N/A		Scalable buffered memory Intel® Virtualization Technology Intel® I/OAT* Intel® QuickData Technology Intel® Intelligent Power Node Manager (Xeon) Intel® Matrix Storage (off ICH10) (Xeon)
Intel® 7510	Intel Itanium® processor 9500, 9300 series; Intel® Xeon® E7-8800/4800/2800 product families,	1-8 + NC support	6.4	1066	DDR3-RDIMM), LV-DIMM, LR-DIMM	64 (4S)	2TB (4 socket)	1Gb 2Gb 4Gb	✓	N/A	N/A	N/A	N/A		Intel® Scalable Memory Interconnect Intel® TXT
Intel® 7512	Intel Itanium® processor 9500 series; Intel® Xeon® E7-8800/4800/2800 product families	1-8 + NC support	6.4	1066	Intel® 7520 (w/DDR 3-RDIMM), LV-DIMM, LR-DIMM	64 (4S)	2TB (4 socket)	1Gb 2Gb 4Gb	✓	N/A	N/A	N/A	N/A		Intel® Scalable Memory Interconnect Intel® TXT

WW17 Enterprise Platform/Chipset Feature Set Reference Table

Chipset	Processor Family	Max # CPUs	Intel® AMT	Integrated Graphics	Integrated HD Audio	Intel® Node Manager and DCMI Options	PCIe 3.0 Ports (CPU)	PCIe 2.0 Ports (CPU)	PCIe 2.0 Ports (PCH)	USB 2.0 Ports	USB 3.0 Ports	SATA (6Gb/s) Ports	SATA (3Gb/s) Ports	Est. SPI Flash Size Req. (MB)	Intel® Rapid Storage Technology (RST)	Intel® Rapid Storage Technology enterprise (RSTe)
Intel® C216	Xeon E3-1200 v2 product family	1	✓	✓	✓			4 (x16 PCIe* 3.0)	8	10 (4 USB 3.0)		2	4	8	✓	
Intel® C206	Xeon E3-1200 v2 product family	1	✓	✓	✓			20	8	14		2	4	8	✓	
Intel® C204	Xeon E3-1200 v2 product family	1				✓		20	8	12		2	4	8	✓	
Intel® C202	Xeon E3-1200 v2 product family	1						16	8	12		0	6	2	✓	
Intel® C226	Xeon E3-1200 v3 product family	1	✓	✓	✓	✓	16		8*	8	6*	6*	0	8	✓	✓
Intel® C224	Xeon E3-1200 v3 product family	1				✓	16		8	8	4	4	2	8		✓
Intel® C222	Xeon E3-1200 v3 product family	1					16		8	8	2	2	4	2		✓

*Port counts are dependent on how IO flexibility is configured between PCIe, SATA 6G and USB 3.0 for a total of 18 ports. C226 will support SATA 1.5/3/6Gb/s

WW17 Enterprise Chipset Feature Set Reference Table

Chipset	Processor Generation	Intel® AMT	Integrated HD Audio	Intel® Node Manager and DCMI Options	PCIe* 2.0 Ports (PCH)	USB 2.0 Ports	SATA (3Gb/s) Ports (AHCI)	SATA (6Gb/s) Ports (AHCI)	SATA only (3Gb/s) Ports (SCU)	SAS or SATA (3Gb/s) Ports (SCU)	RAID levels supported with Intel® Rapid Storage Technology enterprise
C602*	Xeon E5-2600v2, E5-2400v2, E5-4600, E5-2600, E5-2400 & E5-1600 product families	✓	✓	✓	8	14	4	2	4	0	SATA RAID 0/1/5/10
C602J	Xeon E7-8800v2, E7-4800v2, E7-2800v2, E5-2600v2, E5-2400v2, E5-4600, E5-2600, E5-2400 & E5-1600 product families	✓	✓	✓	8	14	4	2	0	0	SATA RAID 0/1/5/10
C604	Xeon E5-2600v2, E5-2400v2, E5-4600, E5-2600, E5-2400 & E5-1600 product families	✓	✓	✓	8	14	4	2	0	4	SATA RAID 0/1/5/10 SAS RAID 0/1/10
C606	Xeon E5-2600v2, E5-2400v2, E5-4600, E5-2600, E5-2400 & E5-1600 product families	✓	✓	✓	8	14	4	2	0	8	SATA RAID 0/1/5/10 SAS RAID 0/1/10
C608	Xeon E5-2600v2, E5-2400v2, E5-4600, E5-2600, E5-2400 & E5-1600 product families	✓	✓	✓	8	14	4	2	0	8	SATA RAID 0/1/5/10 SAS RAID 0/1/5/10
C104	Intel® C104 Scalable Memory Buffer	Details on Intel® C104 Scalable Memory Buffer to be disclosed in a future roadmap-cycle									
C102	Intel® C102 Scalable Memory Buffer	Details on Intel® C102 Scalable Memory Buffer to be disclosed in a future roadmap-cycle									

* Note: In addition to the 5 hard-SKU choices, Intel supports setting Intel® C600 series chipset (Patsburg PCH) features through use of an upgrade ROM when used with the Intel® C602 chipset only. Please contact your Intel field representative for additional details.

Server Platform: Roadmap Enterprise Technologies Reference Table (1 of 2)

Platform Technology	Description
64-bit computing/Intel® 64	64-bit computing and related instructions
Demand Based Switching (DBS) with EIST	Enables server/workstation platform to go into reduced power state during periods of low use
PCI Express® 3.0 (PCIe® 3.0)	Serial I/O technology provides a direct connection between the processor/IOH and PCI Express® component/adapters with bandwidth up to 8 GB/s on each PCI Express gen 2 x8 interface. PCI Express offers higher bandwidth, lower latency and fewer I/O bottlenecks than parallel I/O technologies like PCI and PCI-X
DDR3 Memory	Enables faster memory and increased memory bandwidth at lower power compared to DDR
Intel® Instruction Replay Technology	Enables errant instructions to be re-issued and thereby automatically recover from severe errors to help prevent system crashes and data corruptions
Intel® I/O Acceleration Technology 2 (I/OAT2)	Builds on the performance of I/OAT by reducing the latency of network traffic for latency sensitive applications
Intel® I/O Acceleration Technology (I/OAT)	Platform level I/O acceleration based on improvements in the Processor, MCH and LAN (ESB2 or NIC)
Intel® QuickData Technology	Platform level I/O acceleration based on improvements in the Processor & MCH
Intel® Active Server Management (IASM)	System state-independent access to management functions and asset data
Intel® Virtualization Technology (VT)	Hardware enhancements to the processor enabling Improved virtualization solutions
Intel® Turbo Boost Technology	Dynamically scales processor frequency higher when applications demand more performance and TDP headroom exists.
Intel® Cache Safe Technology	Improves system availability with predictive error handling feature to detect and prevent likely cache line errors. Potentially faulty cache lines are mapped out from future use to improve data integrity
Intel® QuickPath Interconnect	Next generation system interconnect used on Nehalem and Tukwila-based platforms
Intel® Secure Display Technology	<ul style="list-style-type: none"> • One Time Password: token built into chipset. Enables transparent 2-factor user authentication. • Public Key Infrastructure: formerly Platform Embedded Asymmetric Token (PEAT) Uses PKI certificates to authenticate User and Server to each other • Secure Display Technology: Protects system display from malware scraping and proves human presence at PC or WS. For improved transaction verification and ACH fraud prevention; requires pGfx
Intel® Data Protection Technology with Advanced Encryption Standard New Instructions (AES-NI) and Secure Key	Enables fast random numbers for strong keys, strong crypto, strong security
Intel® Platform Protection Technology with OS Guard	Helps prevent malicious software from gaining supervisor mode access
APICv	Reduces the number of exits by redirecting most guest OS APIC reads/writes to a virtual-APIC page to allow most reads to occur without VM exits

Server Platform: Roadmap

Enterprise Technologies Reference Table (2 of 2)

Platform Technology	Description
Intel® SVT	Redefines platform debug, electrical validation, and manufacturing test
Intel® Advanced Vector Extensions (AVX)	A new-256 bit instruction set extension to Intel® SSE and is designed for applications that are Floating Point (FP) intensive.
Intel® Hyper-Threading Technology	Uses processor resources more efficiently, enabling multiple threads to run on each core. As a performance feature, Intel HT Technology also increases processor throughput, improving overall performance on threaded software.
Intel® Trusted Execution Technology	Supports IT compliance by protecting virtualized data centers' private, public, and hybrid clouds against attacks toward hypervisor and BIOS, firmware, and other pre-launch software components.
Intel® Active Management Technology	Allows IT to better discover, repair, and protect their networked computing assets. Enables IT or managed service providers to manage and repair not only their PC assets, but workstations and entry servers as well, utilizing the same infrastructure and tools across platforms for management consistency.
Intel® Rapid Storage Technology enterprise	A RAID driver that loads and runs in the CPU and utilizes the chipset's SATA controllers for creation of RAID volumes. RAID levels 0/1/5/10 are supported.



Intel® Xeon Phi™ product family x200

Intel® Xeon Phi™ processor family

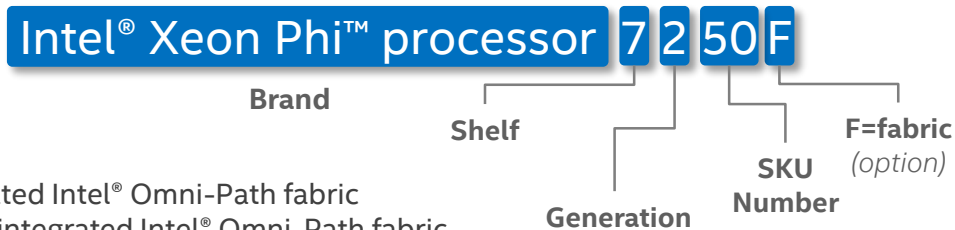


- Intel® Xeon Phi™ processor
- Intel® Xeon Phi™ processor family
- Intel® Xeon Phi™ processor XXXX



- Intel® Xeon Phi™ processor with integrated Intel® Omni-Path fabric
- Intel® Xeon Phi™ processor family with integrated Intel® Omni-Path fabric
- Intel® Xeon Phi™ processor XXXXF with integrated Intel® Omni-Path fabric
- AND/OR-
- Intel® Xeon Phi™ processor XXXXF ←

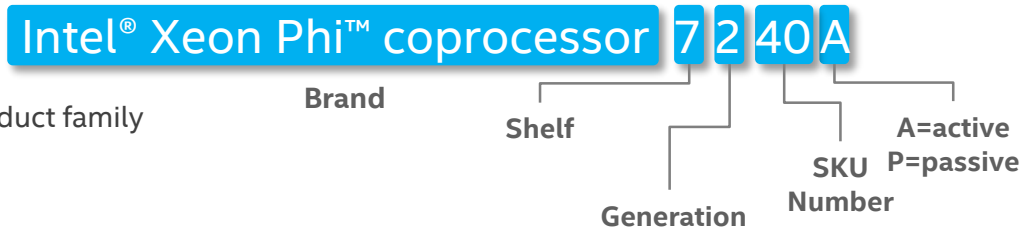
Acceptable short form for use with multiple product listings, space constrained environments, or as second use in a document



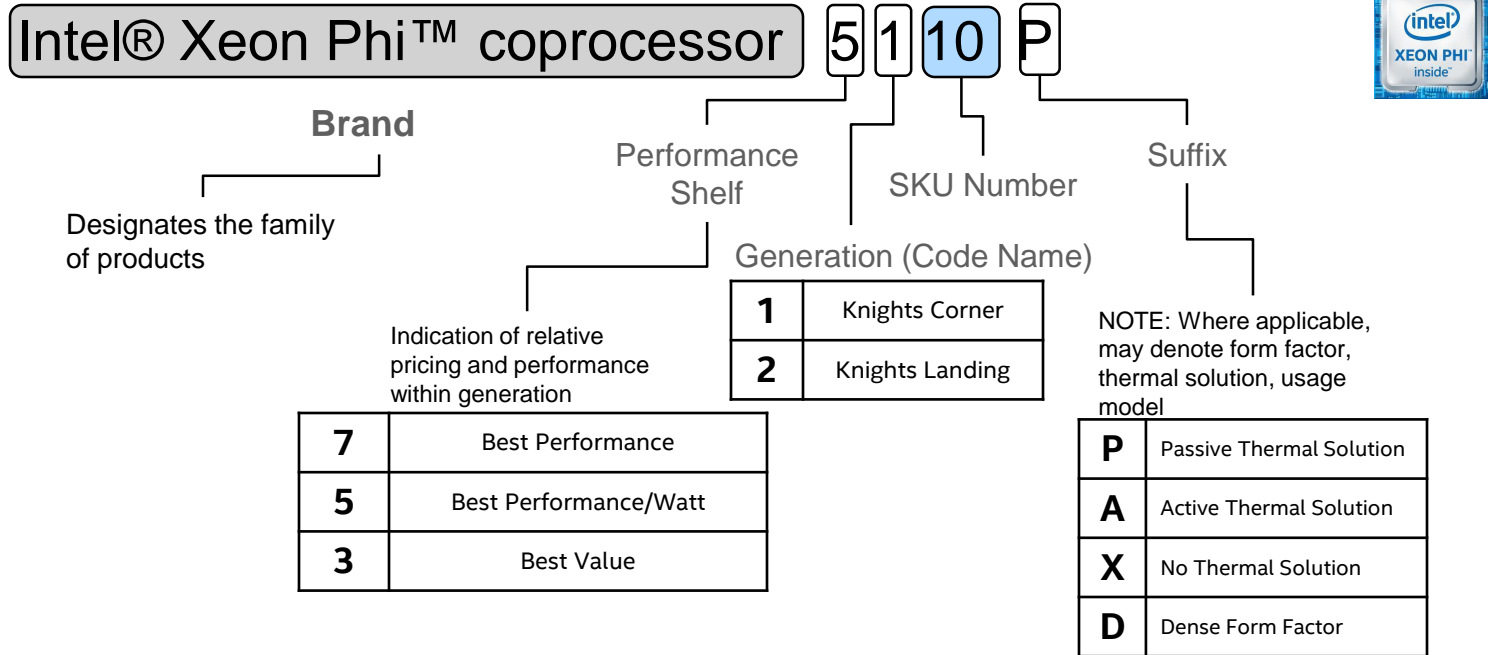
Intel® Xeon Phi™ coprocessor x200



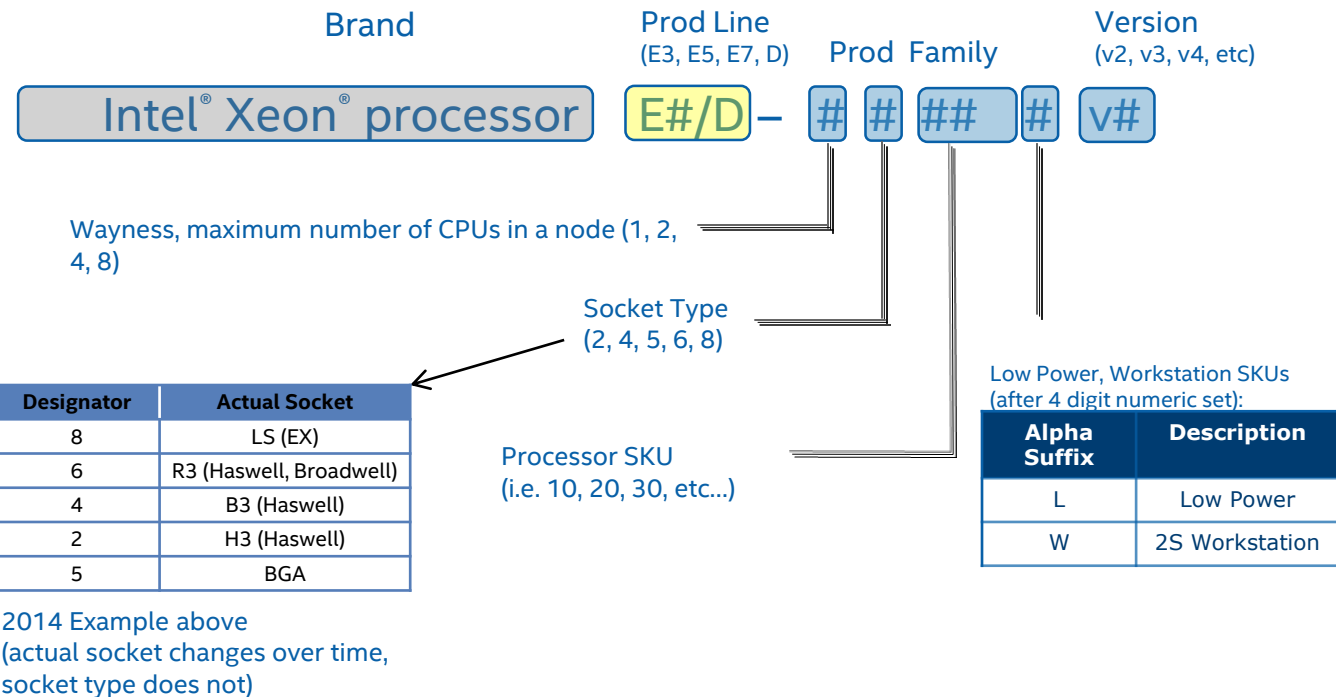
- Intel® Xeon Phi™ coprocessor x200 product family
- Intel® Xeon Phi™ coprocessor x200
- Intel® Xeon Phi™ coprocessor XXXX



Intel® Xeon Phi™ Coprocessor Processor Numbering Overview



Intel® Xeon® Processor Numbering

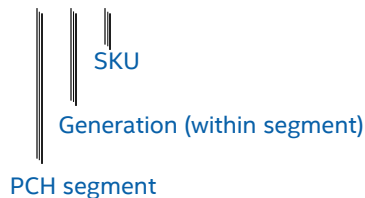


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DCG Chipset Numbering

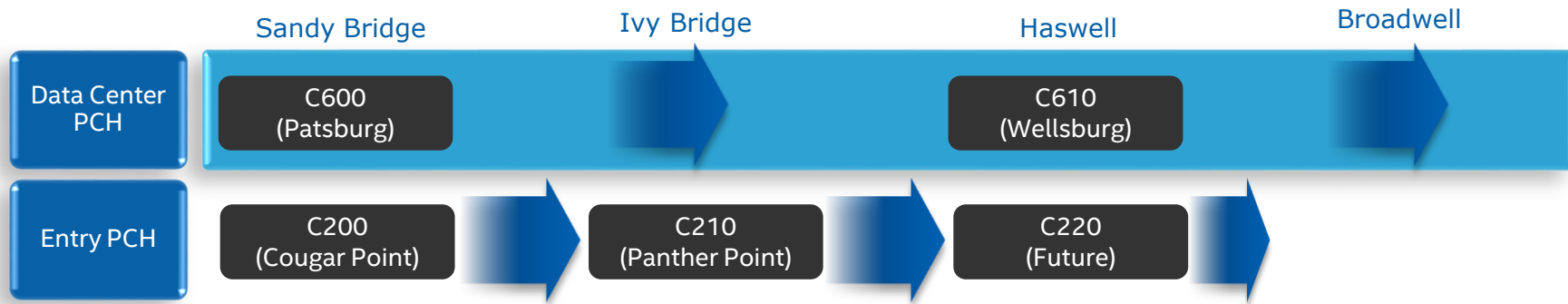
Intel® C600 chipset

Intentionally differentiated from processor numbering; chipsets used across processor product lines



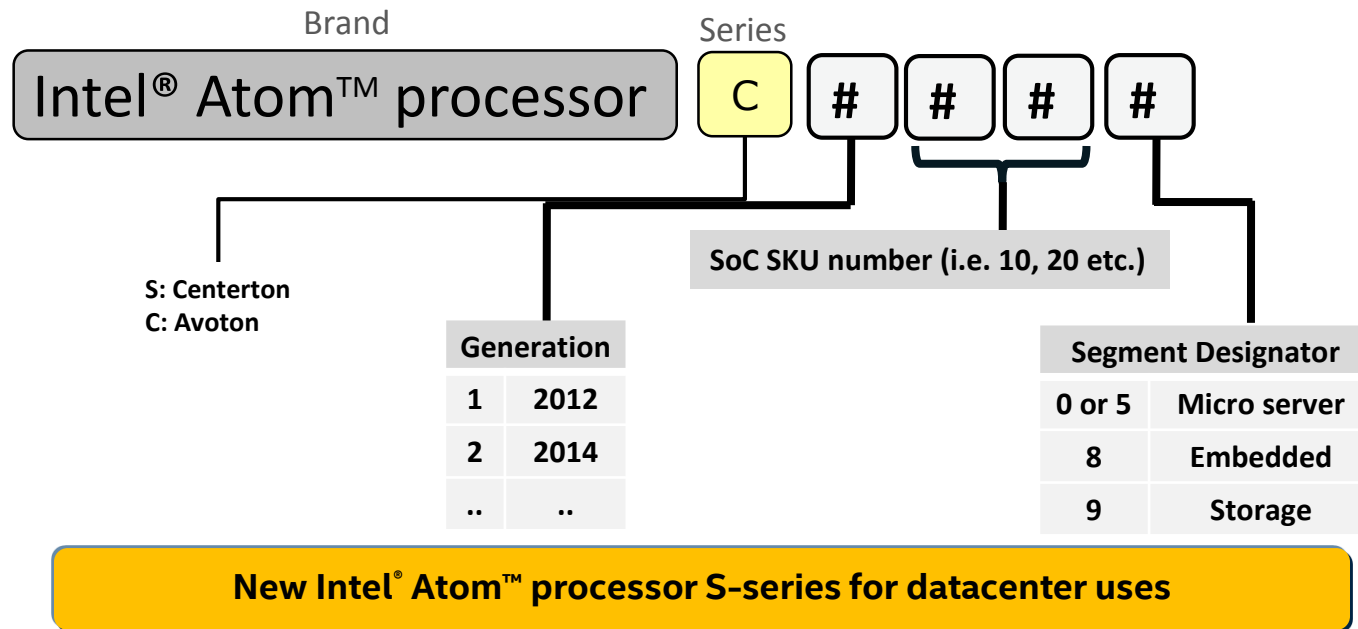
Typical Usages

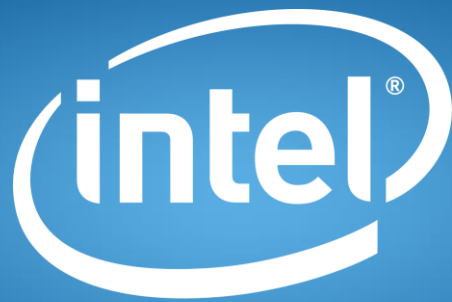
- Collective group reference
- Intel® CXXX series chipset
- Specific SKU
- Intel® CXXX chipset



Note: Ancillary chipset components (i.e. memory buffer) to be 'C100'.

Intel® Atom™ Processor Numbering





experience
what's inside™