

PRODUCT BRIEF & COMPARISON GUIDE

Intel® Xeon® Scalable Processors
Intel® Xeon® W Processors



Ultimate Workstation Performance[†]

Intel® Xeon® Scalable Processors and Intel® Xeon® W Processors for Professional Workstations



Optimized to Over-Deliver[†]

Designed for professionals, workstations powered by Intel® Xeon® processors are the trusted platform for the next generation of professional product designers, content creators, and data scientists. With the ideal combination of processor power, memory, and Intel® Optane™ storage, Intel Xeon processor-based workstations enable you to create, test, and deliver solutions faster than ever.

Intel® Xeon® Processors provides maximum performance and uptimes for workstation workloads[†]



PERFORMANCE

WHAT MATTERS?

I can run applications easily and efficiently without getting bogged down

INTEL® XEON® PROCESSOR ADVANTAGES

Frequency optimized[†] options from 4 to 28 core options, per processor, mean you spend more time creating and less time waiting



UPTIME

I can increase productivity by minimizing system downtime

Server-class processors designed and manufactured to perform in always-on usage scenarios



INNOVATION

I can explore more possibilities by designing in 3D virtual reality

Applications optimized for the vector processing capabilities of Intel® AVX-512 deliver significantly increased performance¹ to drive complex, 3D CAD and content creation applications



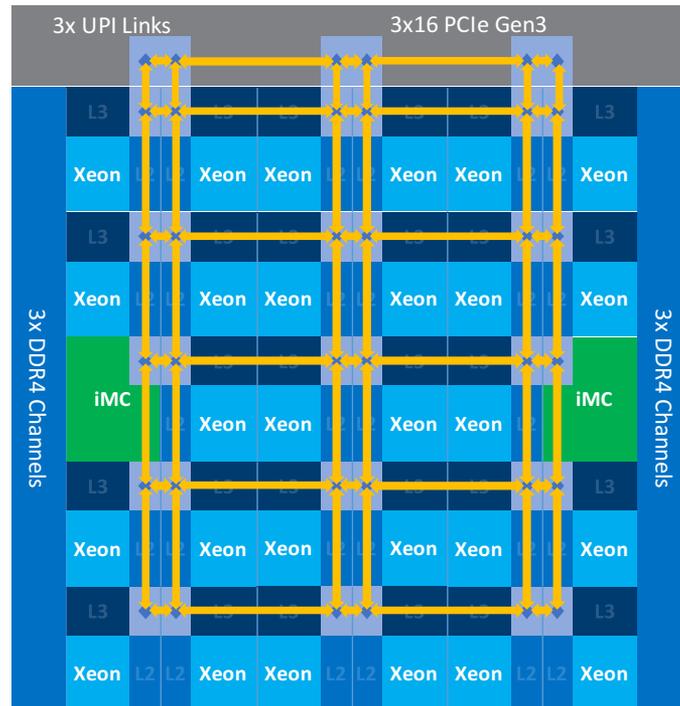
ACCURACY

My designs and simulations are accurate

Error Correction Code (ECC) hardware circuitry built onto workstations powered by Intel® Xeon® processor tests for and corrects errors in your data as it passes in and out of memory

Pervasive, Breakthrough Performance†

From its new Intel® Mesh Architecture and widely expanded resources to its hardware-accelerating technologies like Intel® AVX-512, Intel® Xeon® Scalable and Intel® Xeon® W processor-based workstation platforms enable a new level of breakthrough performance†. Whether your application scales based on processor frequency or on the number of cores and threads, Intel Xeon processors provide a flexible range of options with processors up to 4.5 GHz or up to 28 cores.



In the Intel® Xeon® Scalable processor platform Intel® Mesh Architecture with up to 28 cores (per processor), the Last Level Cache (LLC), six memory channels, and 48 PCIe* channels are shared among all the cores, giving access to large resources across the entire die and creating dynamic scalability without sacrificing performance.

Foundational Enhancements

- **Higher Per-Core Performance or Higher Frequency Performance:** Up to 28 cores and 56 threads, per processor, for Intel Xeon Scalable processors and up to 18 cores and 36 threads for Intel Xeon W processors delivering high performance and scalability for compute-intensive workstation workloads. For frequency-bound workstation applications, Intel Xeon W processors provide up to 4.5 GHz of frequency to drive increased performance.⁴
- **Expanded I/O:** 48 lanes of PCIe* 3.0 bandwidth and throughput for demanding I/O-intensive workloads.
- **Intel® Advanced Vector Extensions 512 (Intel® AVX-512):** With double the flops per clock cycle compared to previous generation Intel® AVX2,¹ Intel® AVX-512 boosts performance and throughput¹ for the most demanding computational tasks in applications, such as modeling and simulation, data analytics and machine learning, visualization, and digital content creation.
- **Intel® Turbo Boost Technology 2.0:** Dynamically increases the processor's frequency, as needed, by taking advantage of thermal and power headroom when operating below specified limits.
- **Intel® Hyper-Threading Technology:** Delivers two processing threads per physical core. Highly threaded applications can get more work done in parallel, completing tasks sooner.
- **Intel® Speed Shift Technology:** Delivers dramatically quicker responsiveness[†] with single-threaded, transient workloads by allowing the processor to more quickly select its best operating frequency and voltage for performance and power efficiency.
- **Intel® vPro™ Technology:** Intel® vPro™ Technology delivers hardware-enhanced security features, identity protection features, and remote manageability features to ease workstation deployment for IT managers.
- **Integrated Intel® Ethernet:** Intel 1 Gigabit Ethernet provides high-bandwidth access to simulation, rendering, or analytics servers.

Essential Workstation Features

- **Error correcting code (ECC):** Error correcting code, or ECC memory, automatically detects and repairs single-bit errors on-the-fly to keep workstation applications running reliably and free of data corruption.

EXPERT WORKSTATION PERFORMANCE



Intel® Xeon® Scalable Processor Performance Compared to a Four-Year-Old, Dual Socket, Expert Workstation Platform³

PRODUCT DEVELOPMENT	MEDIA/ENTERTAINMENT	FINANCIAL SERVICES
3.64X FASTER	2.89X FASTER	2.53X FASTER
3.84X FASTER	4.02X FASTER	2.24X FASTER

MAINSTREAM WORKSTATION PERFORMANCE



Intel® Xeon® W Processor Performance Compared to a Four-Year-Old Mainstream Workstation Platform⁴

PRODUCT DEVELOPMENT	MEDIA/ENTERTAINMENT	FINANCIAL SERVICES
3.67X FASTER	3.36X FASTER	1.75X FASTER
3.61X FASTER	4.07X FASTER	3.16X FASTER

New Intel Xeon Scalable Processors Deliver World Class Performance for Expert Workstation Professionals

Intel Xeon Scalable Processors deliver breakthrough performance¹ for photorealistic design, modeling, and content creation done in real-time. Stunning professional quality VR experiences immerse the creator into the design, simulation, animation, and video.

With up to 28 cores at 3.8 GHz² or 6 cores at 4.2 GHz², per processor, the Intel Xeon Scalable processor delivers dual-socket, world class performance¹, to a broad range of workstation applications.

Based on the SPECwpc* 2.1, a benchmark that measures key aspects of workstation performance based on a diverse set of professional workstation applications, the Intel® Xeon® Platinum 8180 platform delivers an up to 4.02x performance increase³ versus a typical dual-socket 4-year-old workstation based on the Intel® Xeon® E5-2687W v2 platform. The benchmark includes more than 30 workloads to test the processor, graphics, I/O, and memory bandwidth of the workstation.



Intel Xeon Scalable processors are ready for expert-level professional quality VR, a revolution in design and content creation delivering the experience of real life in real time.

New Intel Xeon W Processors Deliver Optimized Performance for Mainstream Workstation Professionals

The new Intel Xeon W processors are based on the Intel Xeon Scalable processor microarchitecture, but designed into a cost-optimized¹ 1-socket form factor specifically for professional workstations.

With up to 18 cores at 4.3 GHz² or 4 cores at 4.5 GHz², Intel Xeon W processors deliver optimized performance¹ whether your workstation application scales best with increased processor core count or with increased processor frequency. With Intel® Turbo Boost Technology, you can further boost performance for frequency-bound applications.

Based on SPECwpc* 2.1 the Intel Xeon W-2155 platform delivers an up to 4.07x performance increase⁴ versus a typical 4-year-old workstation based on the Intel® Xeon® E5-1680 v2 platform.

Note: The Intel® Xeon® W-2155 processor features 10 cores operating at a base frequency of 3.3 GHz. Intel is also offering two higher core count SKUs in the 18 core Intel Xeon W-2195 processor and the 14 core Intel Xeon W-2175 processor. Intel also offers lower core count SKUs with higher base and Intel® Turbo Boost Technology 2.0 frequencies.



Intel Xeon W processors are ready for professional quality VR. Experience the difference in design and product/service development using a professional quality VR solution.

Professional Workstation Storage Support

A balanced workstation platform goes beyond just raw compute, memory, and network performance. Storage innovations can drive significant improvements in efficiency and performance of data-hungry workloads. Both the Intel Xeon Scalable processors and the Intel Xeon W processors feature key storage enhancements.

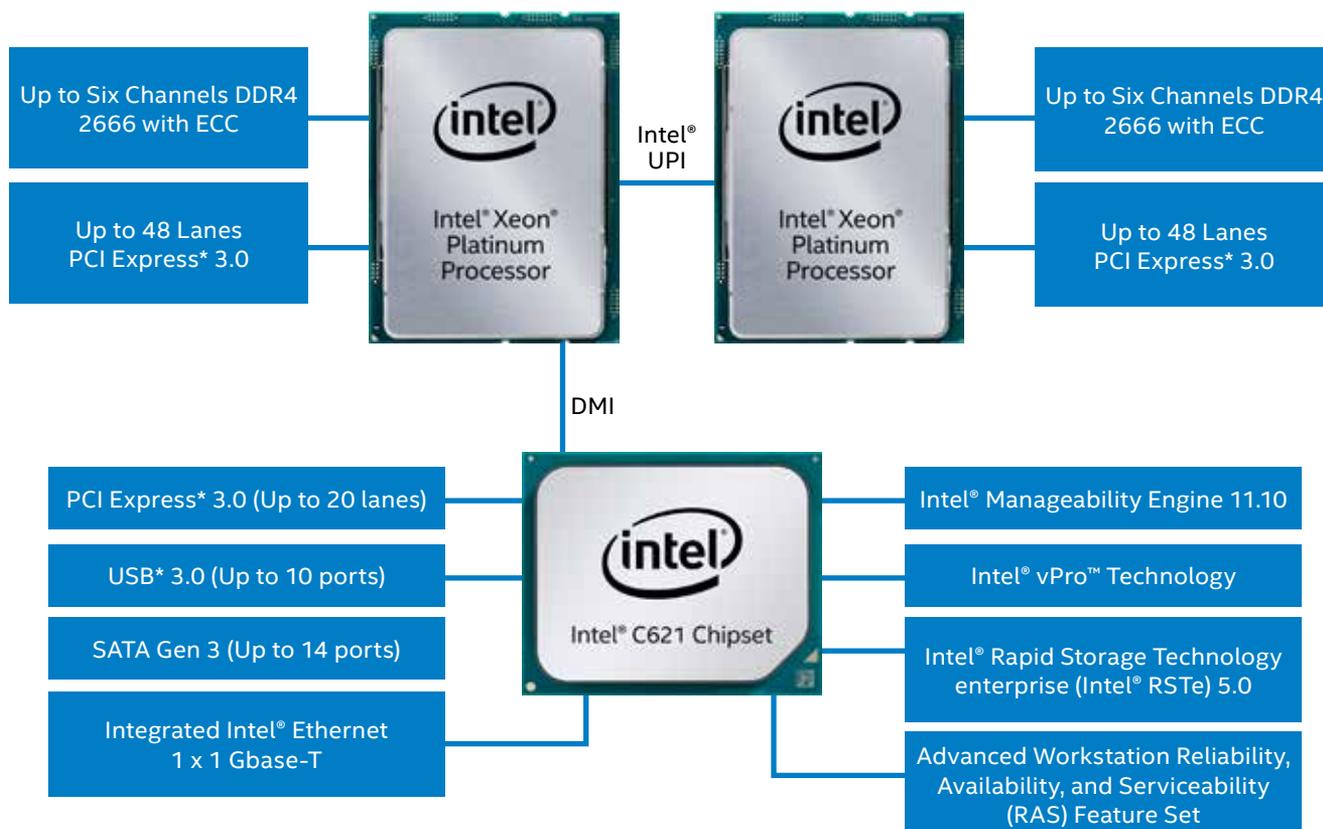
- **Support for Intel® Optane™ SSDs and Intel® 3D NAND Solid State Drives:** Delivers an enhanced combination of high throughput, low latency, high QoS, and ultra-high endurance to break through data access bottlenecks.⁵
- **Intel® Software for Storage:** Optimizes storage hardware, such as encryption, for increased storage performance.
 - **Intel® Virtual RAID on Chip (Intel® VROC):** Directly attach NVMe* SSDs to the CPU PCIe lanes to unleash NVMe* RAID performance at low power and low TCO.

- **Intel® Rapid Storage Technology (Intel® RSTe) for SATA RAID SSDs:** Dynamic storage accelerator accelerates the performance of your SSD by dynamically adjusting system power management policies to deliver enhanced performance during heavy multitasking compared to default power management.
- **Intel® Cache Acceleration Software (Intel® CAS):** Combined with Intel® Solid State Drives, Intel® CAS interoperates with system memory to create a multilevel cache that automatically determines the best cache level for active data.

Workstation Features

	Intel® Xeon® W Processor (2100 Series)	Intel® Xeon® Gold Processor (6100 Series)	Intel® Xeon® Platinum Processor (8100 Series)
Highest Core Count Supported (Per Processor)	18 cores	22 cores	28 cores
Highest Supported Frequency	4.0 GHz (4C/120W)	3.4 GHz (6C/115W)	3.6 GHz (4C/105W)
Number of CPU Sockets	1	2	2
Intel® UPI	N/A	3	3
Intel® UPI Speed	N/A	10.4 GT/s	10.4 GT/s
Intel® AVX-512	2 FMA	2 FMA	2 FMA
Memory Speed Support (DDR4)	2666 MHz	2666 MHz	2666 MHz
Highest Memory Capacity Supported Per Socket	512 GB	768 GB, 1.5 TB	768 GB, 1.5 TB
Memory Channels	4	6	6
Intel® SSD Data Center Family (3D NAND)	•	•	•
PCIe 3.0 (48 lanes)	•	•	•
Intel® Turbo Boost Technology 2.0	•	•	•
Intel® Hyper-Threading Technology	•	•	•
Intel® Speed Shift Technology	•	•	•

Typical Intel® Xeon® Scalable Platform Dual-Socket Configuration



Processors, chipset, and diagram provided for illustration purposes only.

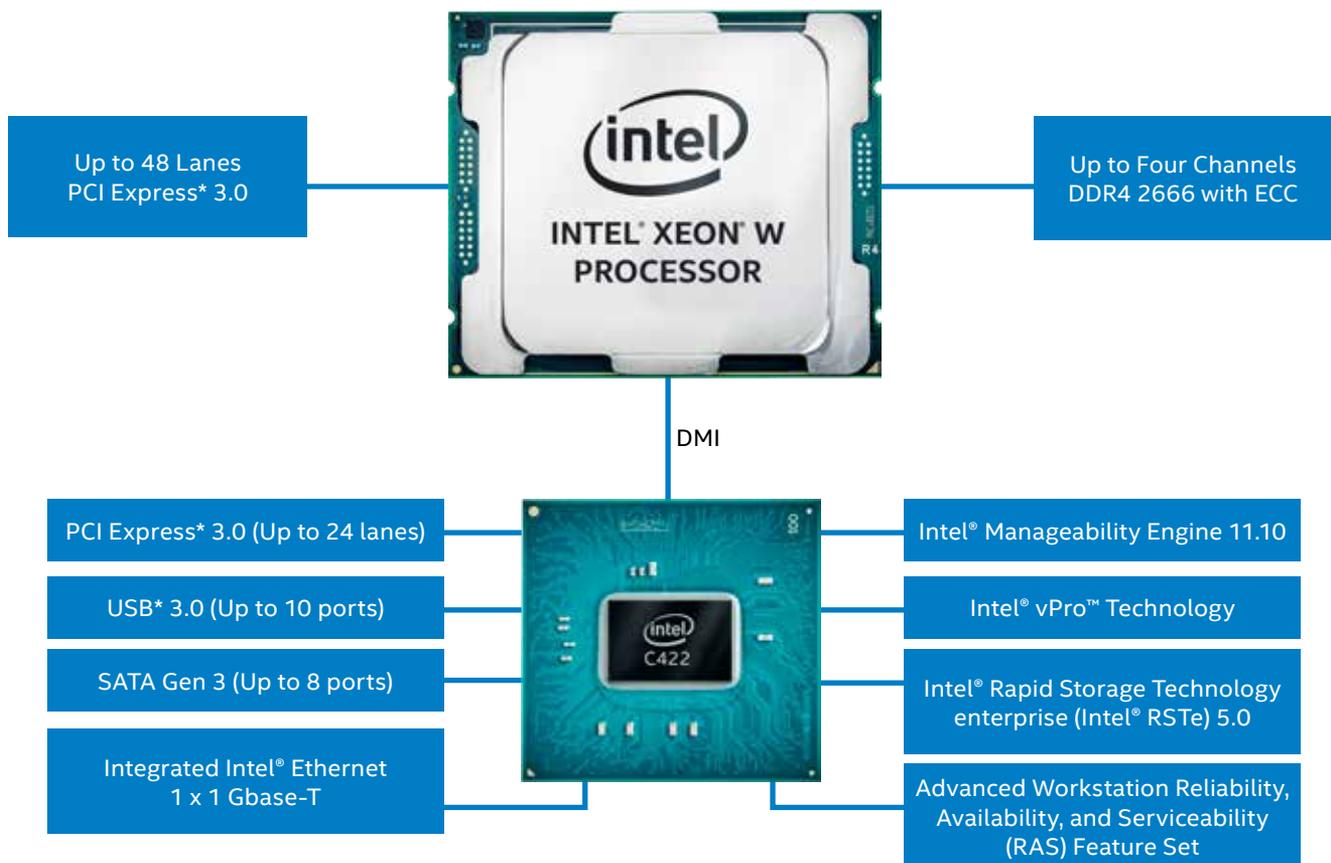
Intel® Xeon® Scalable Processor SKUs and Chipset

SKUS						
SKU	Cores/Threads	Base Speed (GHz)	Max Intel® Turbo Boost Technology 2.0 Speed (GHz)	Intel® AVX-512	TDP (W)	Last Level Cache (MB)
Platinum 8180	28/56	2.5	3.8	2 512-bit FMA	205	38.5
Platinum 8168	24/48	2.7	3.7	2 512-bit FMA	205	33
Platinum 8158	12/24	3.0	3.7	2 512-bit FMA	150	24.75
Platinum 8156	4/8	3.6	3.7	2 512-bit FMA	105	16.5
Gold 6152	18/36	3.0	3.7	2 512-bit FMA	200	24.75
Gold 6152	22/44	2.1	3.7	2 512-bit FMA	140	30.25
Gold 6148	20/40	2.4	3.7	2 512-bit FMA	150	27.5
Gold 6146	12/24	3.2	4.2	2 512-bit FMA	165	24.75
Gold 6144	8/16	3.5	4.2	2 512-bit FMA	150	24.75
Gold 6128	6/12	3.4	3.7	2 512-bit FMA	115	19.25

Visit [intel.com/xeonscalable](https://www.intel.com/xeonscalable) for a complete list of available Intel® Xeon® Scalable processors.

PRODUCT NAME	USB 3.0	SATA* Gen3	PCIe* Gen 3	Intel® Ethernet	DMI
Intel® C621 Chipset	10 ports	14 ports	20 lanes	1 x 1 Gbase-T	x4 Gen 3

Typical Intel® Xeon® W Platform Configuration



Processors, chipset, and diagram provided for illustration purposes only.

Intel® Xeon® W Processor SKUs and Chipset

SKUS						
SKU	Cores	Base Speed (GHz)	Intel® Turbo Boost Technology 2.0 Speed (GHz)	Intel® AVX-512	TDP (W)	Last Level Cache (MB)
W-2195	18	2.3	4.3	2 512-bit FMA	140	24.75
W-2175	14	TBD	TBD	2 512-bit FMA	140	19.25
W-2155	10	3.3	4.5	2 512-bit FMA	140	13.75
W-2145	8	3.7	4.5	2 512-bit FMA	140	11
W-2135	6	3.7	4.5	2 512-bit FMA	140	8.25
W-2133	6	3.6	3.9	2 512-bit FMA	140	8.25
W-2125	4	4.0	4.5	2 512-bit FMA	120	8.25
W-2123	4	3.6	3.9	2 512-bit FMA	120	8.25

Visit intel.com/xeonw for a complete list of available Intel® Xeon® W processors.

PRODUCT NAME	USB 3.0	SATA* Gen3	PCIe* Gen 3	Intel® Ethernet	DMI
Intel® C422 Chipset	10 ports	8 ports	24 lanes	1 x 1 Gbase-T	x4 Gen3



† Statements are based on new Intel products and features compared against historical Intel products and features. Unless otherwise noted, statements and examples referencing Intel® Xeon® Scalable processors are shown based on a dual-socket configuration. Statements and examples referencing Intel® Xeon® W processors are shown as single-socket configurations only.

No computer system can be absolutely secure. Intel technologies may require enabled hardware, specific software, or services activation. Performance varies depending on system configuration. Check with your system manufacturer or retailer.

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 complete information visit www.intel.com/benchmarks.

Cost reduction scenarios described are intended as examples of how a given Intel-based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

Performance varies depending on hardware, software, and system configuration. For more information, visit <http://www.intel.com/go/turbo>

All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest Intel product specifications and roadmaps.

Statements are based on new Intel products and features compared against historical Intel products and features. Unless otherwise noted, statements and examples referencing Intel® Xeon® Scalable processors are shown based on a dual-socket configuration. Statements and examples referencing Intel® Xeon® W processors are shown as single-socket configurations only.

¹ As measured by Intel comparing Intel® Xeon® Processor Scalable Family with Intel® AVX-512 to an Intel® Xeon® E5 v4 processor with Intel® AVX2.

² Intel® Turbo Boost Technology 2.0 frequency shown. Performance varies depending on hardware, software, and system configuration. For more information, visit <http://www.intel.com/go/turbo>

³ Intel® Xeon® Scalable processor performance compared to a four-year-old expert workstation. Config: Estimated SPECwpc 2.1:1-Node, 2 x Intel® Xeon® Processor E5-2687W v2 on Grantley-EP (Wellsburg) with 64GB of memory on Microsoft® Windows® 7 Professional 64-bit using Nvidia® Quadro K2200 graphics card and Seagate HDD 3.5" 500G, 7200 RPM compared to 1-Node, 2 x Intel® Xeon® Gold 6154 Processor on Wolf Pass SKX system with 384GB of memory on Microsoft® Windows® 10 Enterprise 64-bit edition using Nvidia® Quadro P2000 graphics card and Intel® SSD S3710 800GB for OS, P3700 1.5T for workload. Comparison performed by Intel.

⁴ Intel® Xeon® W processor performance compared to a four-year-old mainstream workstation. Config: Estimated SPECwpc 2.1:1-Node, 1x Intel® Xeon® Processor E5-1680 v2 on Romley-EP Crownpass system with 64GB of memory on Microsoft® Windows® 7 Professional 64-bit using AMD® FirePro® W5000 DVI graphics card and TOSHIBA 1TB HDD compared to 1-Node, Intel® Xeon® W-2155 Processor on a Basin Falls RVP system with 128GB of memory on Microsoft® Windows® 10 Enterprise edition using Nvidia® Quadro P2000 graphics card Intel® SSD S3710 400GB for OS, P3700 800GB for workload. Comparison performed by Intel.

⁵ Responsiveness defined as average read latency measured at queue depth 1 during 4k random write workload. Measured using FIO 2.15. Common configuration - Intel 2U PCSD Server ("Wildcat Pass"), OS CentOS 7.2, kernel 3.10.0-327.el7.x86_64, CPU 2 x Intel® Xeon® E5-2699 v4 @ 2.20GHz (22 cores), RAM 396GB DDR @ 2133MHz. Intel drives evaluated - Intel® Optane™ SSD DC P4800X 375GB and Intel® SSD DC P3700 1600GB. Samsung drives evaluated - Samsung® SSD PM1725a, Samsung® SSD PM1725, Samsung® PM963, Samsung® PM953. Micron drive evaluated - Micron® 9100 PCIe® NVMe™ SSD. Toshiba drives evaluated - Toshiba® ZD6300. Test - QD1 Random Read 4K latency, QD1 Random RW 4K 70% Read latency, QD1 Random Write 4K latency using fio-2.15.

Optimization Notice: Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel. Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice. Notice revision #20110804