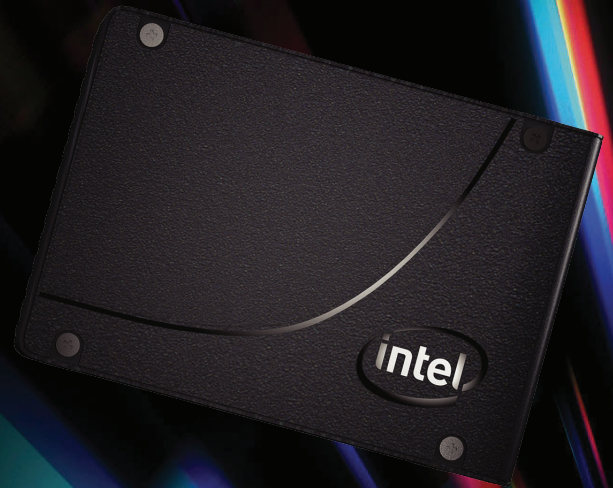


# REDEFINING THE DATA CENTER



## with Intel® Optane™ Technology

With an industry-leading combination of high throughput, low latency, high QoS, and high endurance, the Intel® Optane™ SSD DC P4800X provides a new data storage tier that allows you to execute larger datasets faster than ever, while reducing system DRAM to significantly lower data center cost.



### Breakthrough Performance IOPS

UP TO  
**6x**  
FASTER AT LOW QUEUE DEPTHS<sup>1</sup>

### High Endurance

UP TO  
**20x**  
MORE TOTAL TERABYTES WRITTEN AT SIMILAR CAPACITY<sup>2</sup>

### Predictably Fast Service QoS

UP TO  
**60x**  
BETTER AT 99% QoS<sup>3</sup>

### Responsive Under Load Low Latency

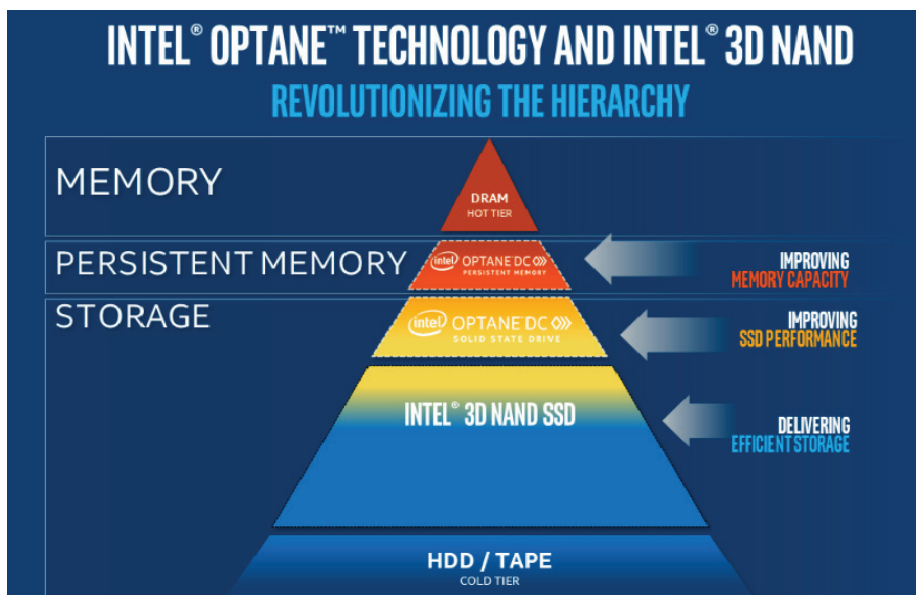
UP TO  
**63x**  
FASTER RESPONSE TIME UNDER WORKLOAD<sup>4</sup>

## ACCELERATE YOUR EXPERIENCE

The first breakthrough in non-volatile memory in over two decades, Intel® Optane™ technology bridges the gap between storage and memory, with higher endurance than NAND and increased density compared to DRAM.

## MULTIPLE DESIGNS FOR MULTIPLE USE CASES

Because no two use cases are exactly the same and storage needs vary widely, Intel® Optane™ SSDs come in a variety of form factors to support data center demands.



For more info visit – <http://intel.com/optane>



### 2 Form Factors

Add-in card (AIC), half height, half length, low profile; U.2 2.5-inch



### Intel® Optane™ Technology

Capacities up to 750GB



### Up to 550/500k IOPS

4 KB random, queue depth 16, read/write: up to 550/500k IOPS



### Latency (typical) R/W

<10µs



### NVMe\* Interface

Compatible with PCIe\*



5-Year Warranty

# THE IDEAL CACHING SOLUTION

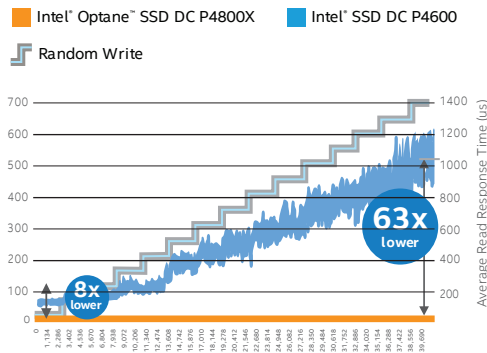


**LOWER AND MORE CONSISTENT LATENCY**

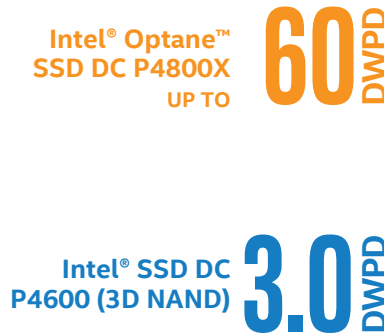
**HIGHER ENDURANCE**

**MORE EFFICIENT**

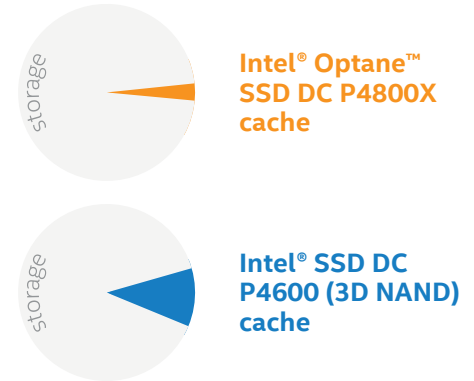
Average Read Latency Under Random Write Workload<sup>4</sup>



Drive Writes Per Day (DWPD)<sup>5</sup>



Cache as a % of Storage Capacity<sup>6</sup>



## ACCELERATING THE CACHE TIER WITH INTEL® OPTANE™ SSD

### VMware vSAN\* Solution

Intel® Optane™

**VMware vSAN\* Yesterday**

**Today**

UP TO

**63%**

**MORE VMs COMPARED TO ALL-NVME\* FLASH<sup>7</sup>**

UP TO

**3.6x**

**MORE VMs vs. NVME\* + SATA<sup>8</sup>**

UP TO

**3x**

**LESS EXPENSIVE \$/VM THAN NVME\* + SATA<sup>8</sup>**

### INTEL® OPTANE™ SSD ON HPE\* PLATFORMS

Product	Capacity	HPE Model # PN	HPE Description	Qualified Platforms
Intel® Optane™ SSD DC P4800X	375GB	878014-B21	HPE 375GB NVMe x4 WI SFF SCN DS SSD	Gen 9 & Gen 10 ProLiant DL380, DL360, DL560, ML350 Gen 9 & Gen 10 Apollo 4000, 6000 Gen 9 & Gen 10 HPE Integrity Superdome 2 i6 Server & HPE Integrity rx2800 i6 Server Gen 9 & Gen 10 HPE Synergy 480 (Note: HH Cards not supported)
	750GB	878038-B21 P06952-B21	HPE 750GB PCIe x4 WI HH DS Card HPE 750GB NVMe x4 WI SFF SCN DS SSD	

1. Source – Intel-tested: 4K 70/30 RW Performance at low queue depth. Measured using FIO 3.1. Common Configuration - Intel 2U Server System, OS: CentOS 7.5, Kernel 4.17.6-1.el7.x86\_64, CPU 2 x Intel® Xeon® 6154 Gold @ 3.0GHz (18 cores), RAM 256GB DDR4 @ 2666MHz. Configuration – Intel® Optane™ SSD DC P4800X 375GB compared to Intel® SSD DC P4600 1.6TB. Intel Microcode: 0x2000043; System BIOS: 00.01.0013; ME Firmware: 04.00.04.294; BMC Firmware: 1.43.9176955; FRUSDR: 1.43. The benchmark results may need to be revised as additional testing is conducted. Performance results are based on testing as of November 30, 2018 and may not reflect all publicly available security updates. See configuration disclosure for details. No product can be absolutely secure.

2. Source – Intel: Endurance ratings available at <https://www.intel.com/content/www/us/en/solid-state-drives/optane-ssd-dc-p4800x-brief.html>

3. Source – Source – Intel-tested: Measures 99 percent QoS under 4K 70-30 workload at QD1 using FIO 3.1. See configuration in Footnote 1 above. Performance results are based on testing as of July 24, 2018 and may not reflect all publicly available security updates.

4. Source – Intel-tested: Response Time refers to average read latency measured at queue depth 1 during 4K random write workload using FIO 3.1. See configuration in footnote 1 above. Performance results are based on testing as of July 24, 2018 and may not reflect all publicly available security updates.

5. Source – Intel: Endurance rating available at <https://www.intel.com/content/www/us/en/solid-state-drives/optane-ssd-dc-p4800x-brief.html>

6. Source – Intel: General proportions shown for illustrative purposes.

7. Tests by The Evaluator Group, commissioned by Intel. See config details at <https://www.evaluatorgroup.com/document/lab-insight-latest-intel-technologies-power-new-performance-levels-vmware-vsan-2018-update/>. Tested using IOmark-VM. Performance results are based on testing as of August 20, 2018 and may not reflect all publicly available security updates. See product configuration disclosure details. Both configurations tested using Intel® Xeon® Gold 6154 processor. Previous configuration: Storage media: 1 P4600 1.6 TB SSD + 4 x P4500 (3 x 4TB and 1 x 2TB SSD). Performance: 704 IOmark-VM; Current configuration: Storage media: 2 x P4800X 375GB SSD + 5 x P4500 4TB SSD, Performance: 1152 IOmark-VM. ESXi ESXi-6.7.0-8169922 Build 8169922, Ubuntu Linux 18.04, BIOS SE5C620.86B.00.01.0013.030920180427.\*\*

8. When comparing results from testing doc referenced in footnote 7. Previous configuration: Intel® Xeon® E5-2699 v4 processor, ESXi ESXi600-201803001 Build 7967764, Ubuntu Linux 18.04, BIOS 2600WT SE5C610.86B.01.01.0024. Storage media: 1 3700 800GB SSD + 6 x S3510 1.6TB. Performance: 320 IOmark-VM, Price/Performance: \$684/VM; Current configuration: Intel® Xeon® Gold 6154 processor, ESXi ESXi-6.7.0-8169922 Build 8169922, Ubuntu Linux 18.04, BIOS SE5C620.86B.00.01.0013.030920180427. Storage media: 2 x P4800X 375GB SSD + 5 x P4500 4TB SSD, Performance: 1152 IOmark-VM, Price/Performance: \$216/VM. Storage media: 1 x P3700 + 4 x Seagate 1TB 10K HDD, Performance: 88 IOmark-VM-HC, Price/Performance: \$2153 / IOmark-VM-HC; Current configuration: Storage media: 2 x P4800X SSD + 4 x P4500 4TB SSD, Performance: 704 IOmark-VM-HC, Price/Performance: \$684 / IOmark-VM-HC.\*\*

\*\*For claims 7 and 8, performance results are based on testing as of August 20, 2018 and may not reflect all publicly available security updates. See configuration disclosure for details.

No product or component can be absolutely secure.

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](http://www.intel.com/benchmarks).

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