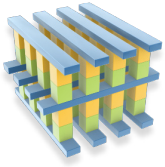
INTEL® OPTANE™ DC SSDs

BREAKTHROUGH PERFORMANCE	PREDICTABLY FAST SERVICE	RESPONSIVE UNDER LOAD	HIGH ENDURANCE
up to **6X FASTER**	up to **60X BETTER**	up to **63X FASTER**	up to **20X MORE**
QUEUE DEPTH 1 4K 70/30 RW IOPS[1]	99% QOS[2]	RESPONSE TIME[3]	TOTAL TERABYTES WRITTEN[4]

REVOLUTIONARY MATERIAL



Significant memory and storage advancement **in the last 20 years**

WRITE IN PLACE

Set or reset data as needed, **no need to erase media**

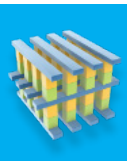
BIT ADDRESSABLE

Every memory cell can be **individually addressed**

LOW LATENCY

...together delivering **extremely fast media**

BUILDING BLOCKS



Intel® Optane™ Memory Media

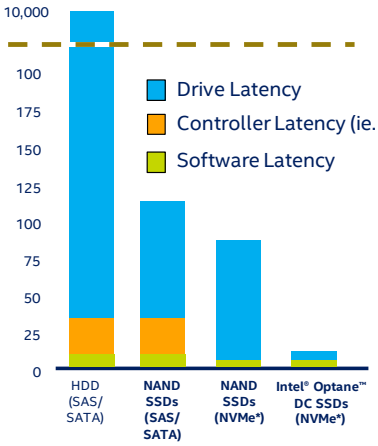
+

- Intel Interconnect IP
- Intel Software
- Intel Memory and Storage Controllers

END-USER VALUE[5]

- **High** Endurance
- **More responsive under load** Improved latency
- **Predictably fast service** QoS
- **Breakthrough performance** IOPS

LATENCY[5] (µS)



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.

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: 1.43.91f76955; 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-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.

3. 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.

4. Source – Intel: Endurance ratings available at https://www.intel.com/content/www/us/en/products/docs/memory-storage/solid-state-drives/data-center-ssds/optane-ssd-dc-p4800x-p4801x-brief.html

5. End User Value Source – Intel-tested: Average read latency measured at queue depth 1 during 4k random write workload. 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 and Intel® SSD DC P4600 1.6TB. Latency – Average read latency measured at QD1 during 4K Random Write operations using FIO 3.1. Intel Microcode: 0x2000043; System BIOS: 00.01.0013; ME Firmware: 04.00.04.294; BMC Firmware: 1.43.91f76955; FRUSDR: 1.43. SSDs tested were commercially available at time of test. The benchmark results may need to be revised as additional testing is conducted. Performance results are based on testing as of July 24, 2018 and may not reflect all publicly available security updates. See configuration disclosure for details. No product 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.

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