



PCIe/NVMe Brings Higher Performance to Embedded Applications

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Outline

- Current NVMe/PCIe SSD Trend
- Embedded SSD – Application & Needs
- PCIe SSD vs. SATA SSD Performance
- Summary



Current NVMe/PCIe SSD Trend

- More support of NVMe in major OS
- Top tier OEM, ODM and Semiconductors are driving NVMe





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Embedded SSD – Application & Needs

Applications:

- Factory Automation
- Video Surveillance
- Casino Gaming Machine
- KIOSK
- Infotainment systems
- Thin Client

Needs:

- Customization
- Endurance
- Security
- Performance ★
- Form Factor





Performance References

Latency: A measurement of time needed to process a task from a system's request to completing. (ms)

Throughput: A measurement of the amount of data that can be processed in a given time (MB/s)

IOPS: A measurement of the total number of task being processed every second.



Performance & Application

KIOSK, Digital Signage & Point of Sale machine

- User experience may be affected due to responsiveness
- Require low latency & fast response time



Surveillance Camera, Servers & Thin Client

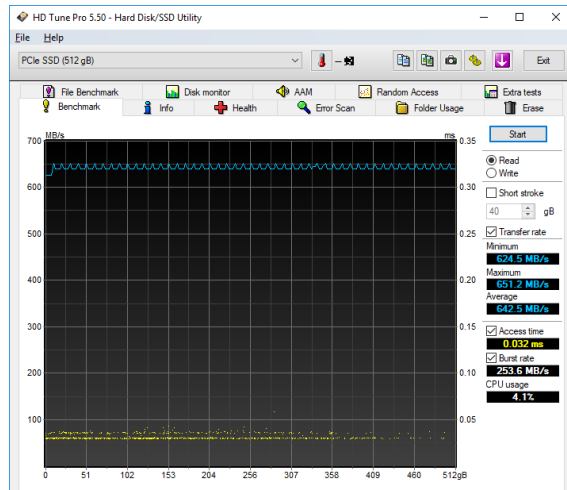
- Large and long period of data processing
- Require high throughput & IOPS



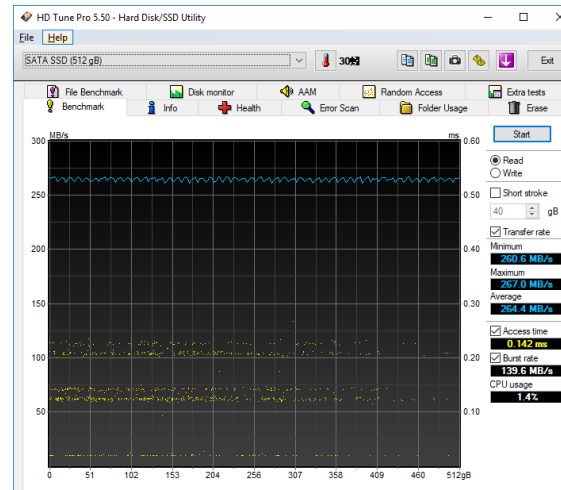
Latency Performance



PCIe SSD Average Latency: 32us



SATA SSD Average Latency: 142us



Benchmark tool: HD Tune Pro
Measure average read latency

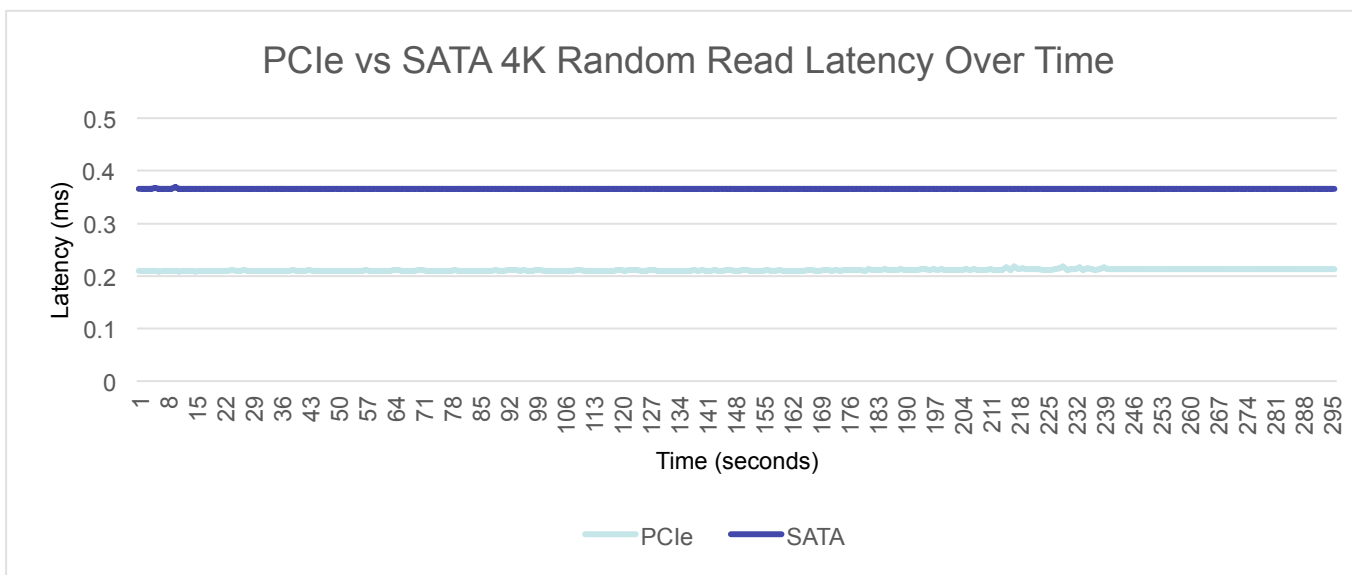
PCIe SSD:
E8 Gen3x2 + BiCS3

SATA SSD:
S10C 4Ch SSD + BiCS3

PCIe SSD has ~4.4x lower latency than SATA SSD



Latency Performance



Benchmark tool: IOMeter
4K Random Read

PCIe Avg: 0.211 ms
SATA Avg: 0.364 ms

PCIe SSD has lower latency than SATA SSD

Throughput & IOPS Performance



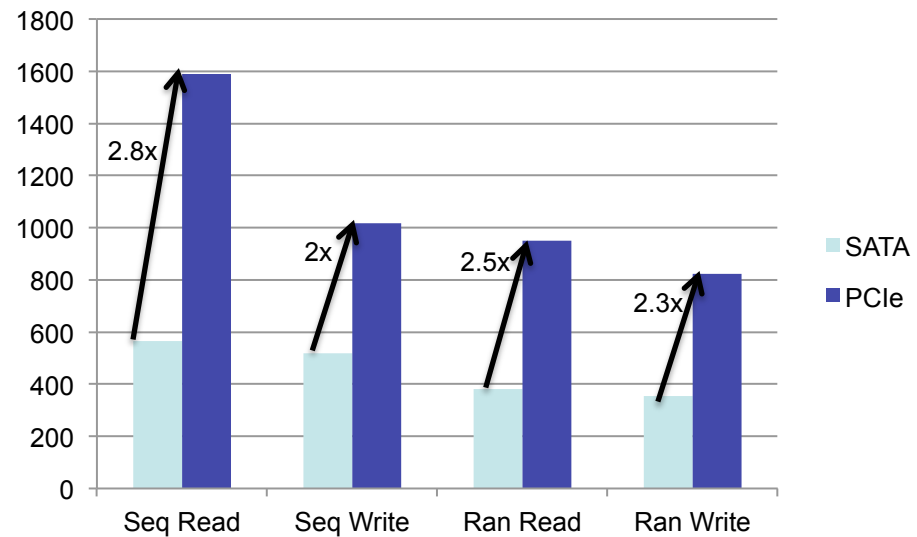
Crystal Disk Mark v5.1.0

PCIe SSD

	Read [MB/s]	Write [MB/s]
Seq Q32T1	1589	1019
4K Q32T1	952.5	823.0
Seq	988.2	963.0
4K	40.94	161.2

SATA SSD

	Read [MB/s]	Write [MB/s]
Seq Q32T1	564.4	517.6
4K Q32T1	383.7	353.5
Seq	554.3	510.4
4K	41.96	129.3



PCIe SSD has better throughput/IOPS than SATA SSD



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Summary

- Ecosystem is enabling more NVMe supports for major OS & companies
- Latency, throughput & IOPS plays a key role for certain embedded applications
- PCIe SSD provides higher performance compare to SATA SSD

For more information on Phison SSD Controllers,
please visit us at

Booth #614



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- Digital Signage
- UFS

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Thank You