



Flash Memory Summit

DapuStor

Enterprise & Datacenter SSD Development in China Market

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DapuStor Corporation

2022-8



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01 Challenges & Opportunities

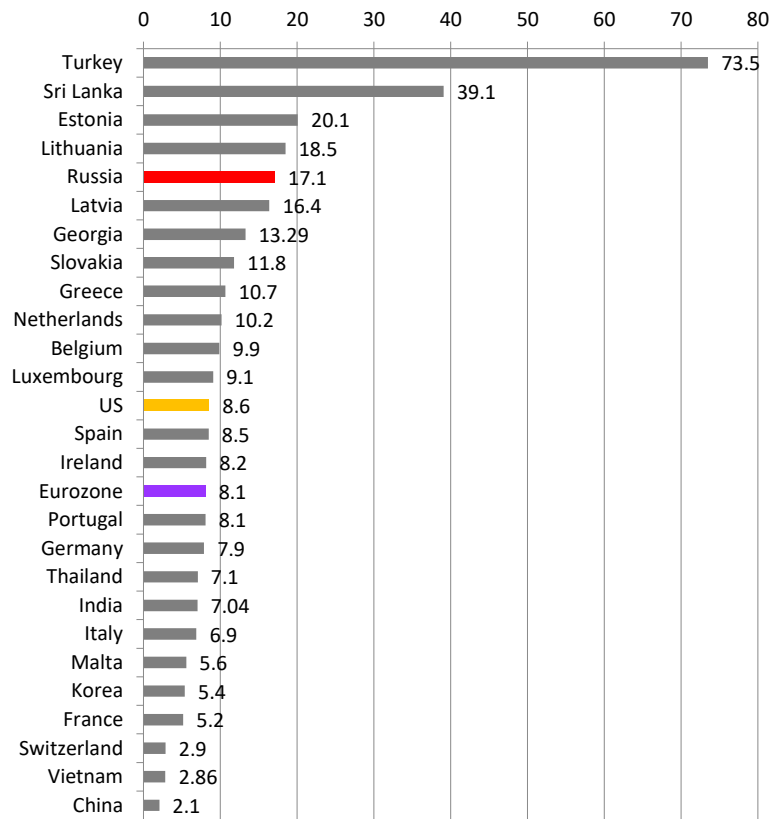
Challenges – Macroeconomics & Market



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Year-on-Year **CPI Growth in May 2022**(Unit:%)

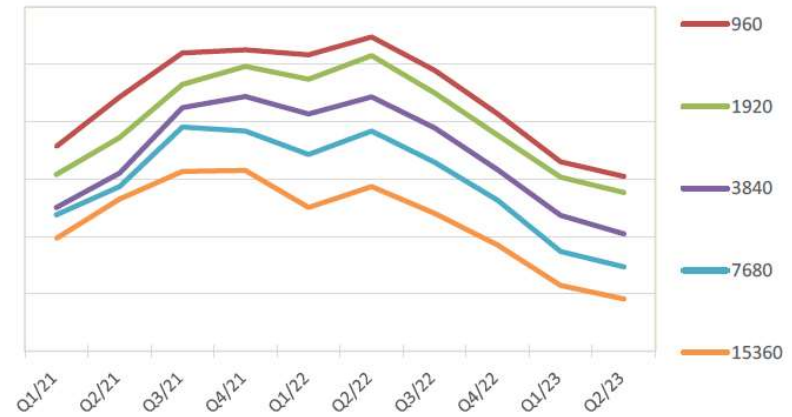


2022 China Enterprise SSD

- ✓ Weak demand
- ✓ Over supply
- ✓ Price is decreasing

PCIe SSD Price Trend

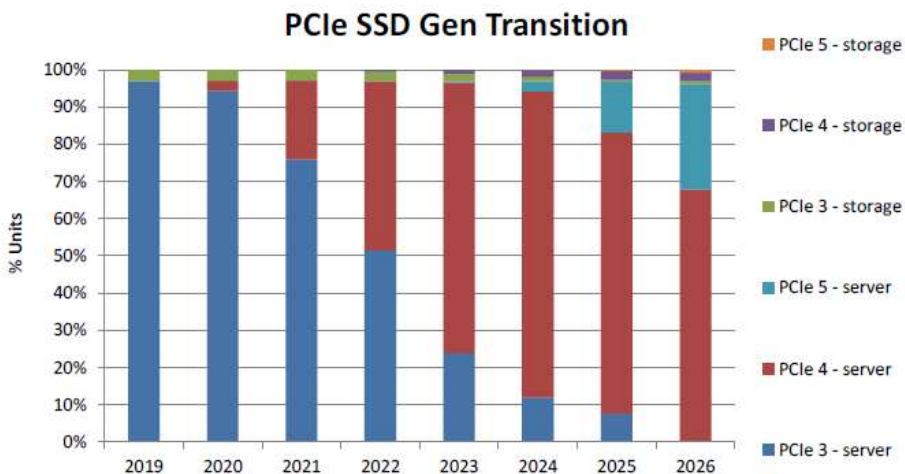
<1DWPD PCIe SSD ASP Trend



Source: Forward Insights

Challenges – PCIe Gen5 CPU and eSSD

	2020	2021	2022	2023	2024
CPU Platform	Intel		AMD		
	Cascade lake&Refresh core 14nm&Max core 28 PCIe3.0		Ice lake 10nm&Max core 40 PCIe4.0	Sapphire Raid ~10nm&Max core 56 PCIe5.0	Grantite Rapids ~5nm
		Rome 14nm&Max core 64 PCIe4.0	Milan 7nm&Max core 64 PCIe4.0	Genoa 5nm&Max core 96 PCIe5.0	Bergamo 5nm&Max core 128 Turin 3nm&Max core 128



Source: Forward Insights

China market:

Most of the main players in the market are expected to finish development of PCIe Gen5 platforms in Q3-Q4/2022, but due to CPU's delay, players are most likely to launch PCIe 5.0 platforms in Q1-Q2/2023 subsequently.

Challenges:

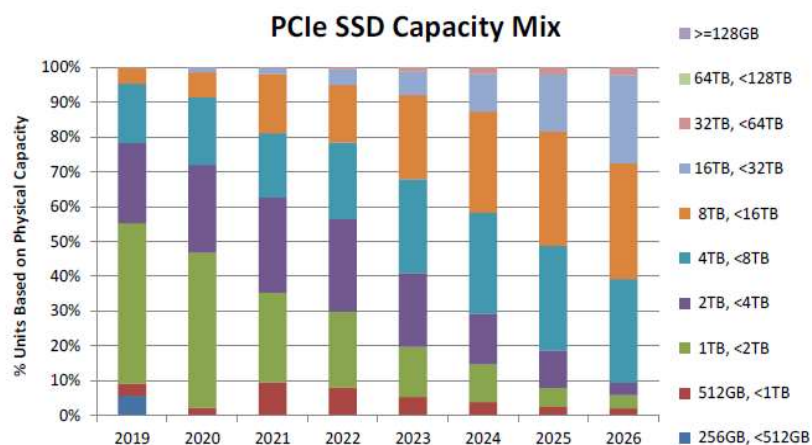
- PCIe Gen5 SI w/ U.2
- DDR5's cost
- Backplane cost
- Power efficiency
- NAND transition very fast

Opportunities - PCIe eSSD Capacity and FF Trends

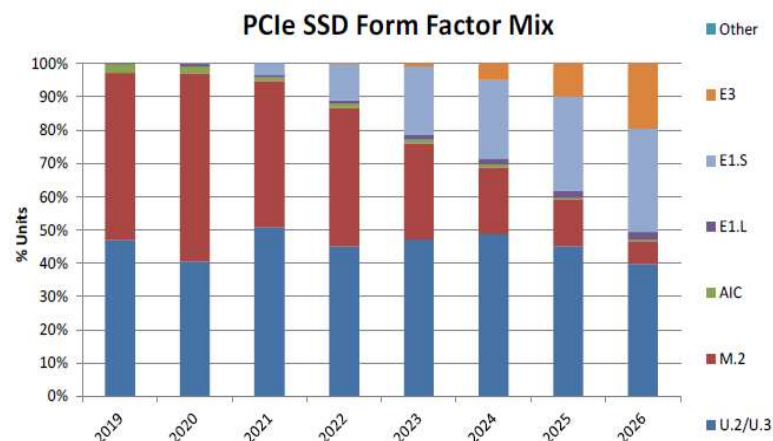


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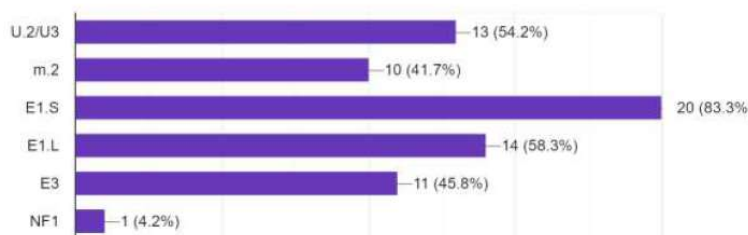
Source: Forward Insights



Opportunities - EDSFF: More Suitable for NAND FLASH

Which form factors would you care about in the 2021+ time frame?

24 responses



	Now	To Be
1U SERVER	10 x U.2: ~80TB	32 x E1.S: ~128TB 20 x E3.S: ~160TB
2U SERVER	24 x U.2: ~192TB	46 x E3.S: ~368TB

60~100%



DapuStor: First market of E1.S in China back to 2021.

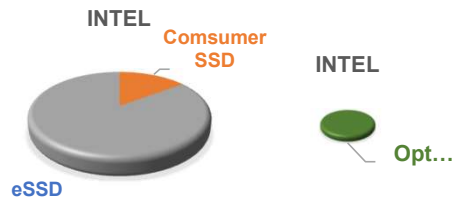
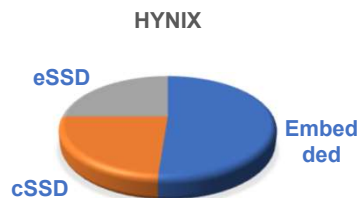
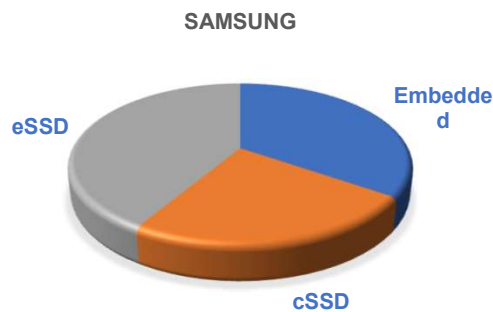
Opportunities – ‘Domestic’



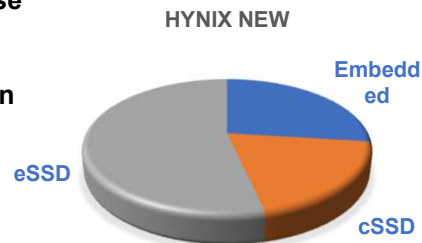
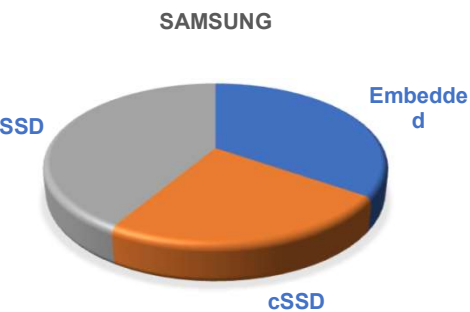
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2021~: **Over 70% of China** eSSD, comes from Samsung & Hynix



Enterprise Storage For Data explosion Era!



~2022:
Domestic Player

2023~:
Domestic Controller



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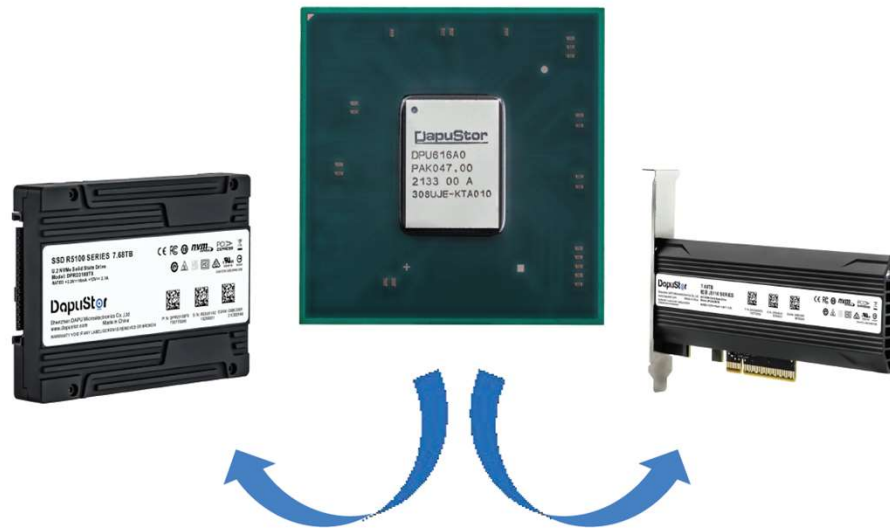
02 DapuStor Solutions for China Enterprise/ DC SSD Key features

In-house Controller for 'Domestic'



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Smart IO – For High Random Write

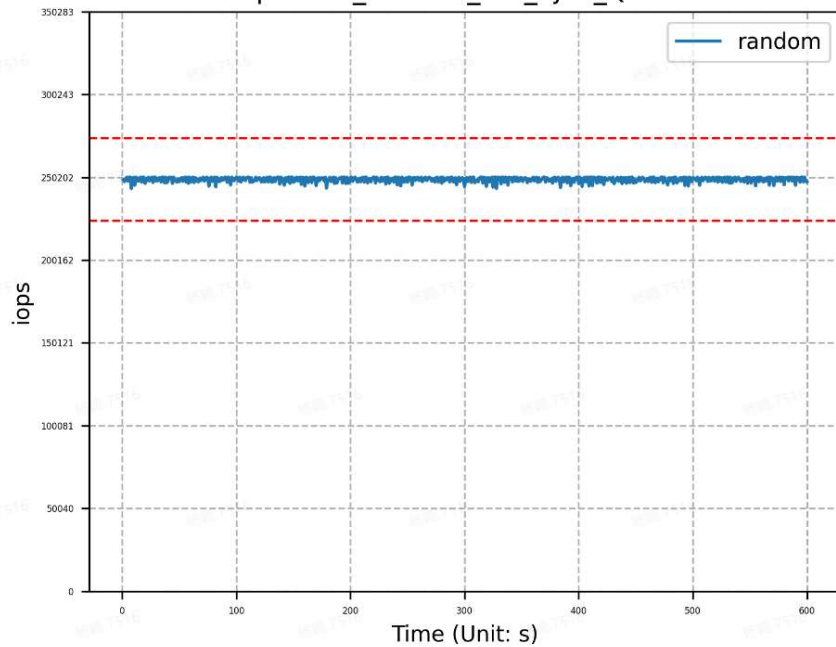


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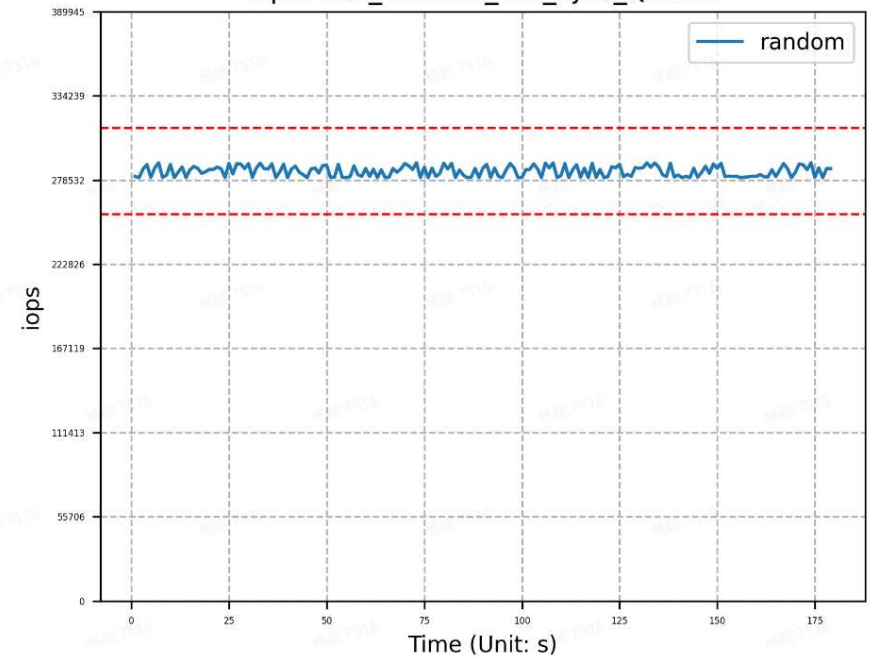
Smart IO Disable: 250K

iops: 4kB_random_WR_1job_QD128



Smart IO Enable: 274K

iops: 4kB_random_WR_1job_QD128



Smart IO – For Better QoS

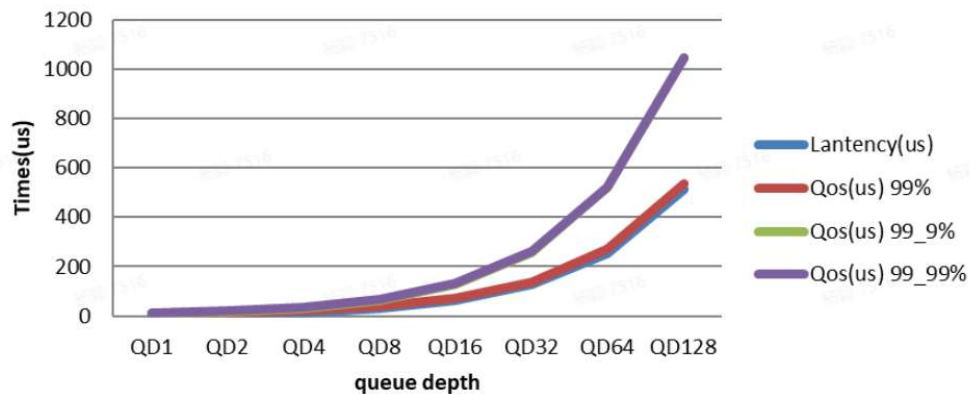


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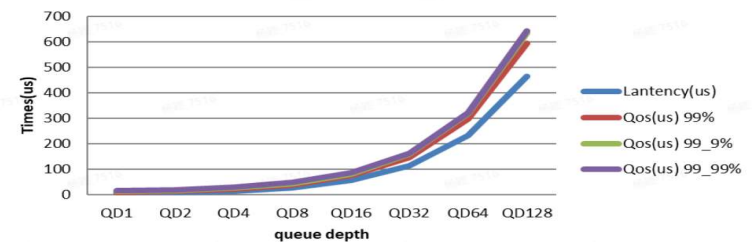
Smart IO Disable: Good QoS

4kB_Random_write



Smart IO Enable: Best QoS

4kB_Random_write



SRIOV - Benefit



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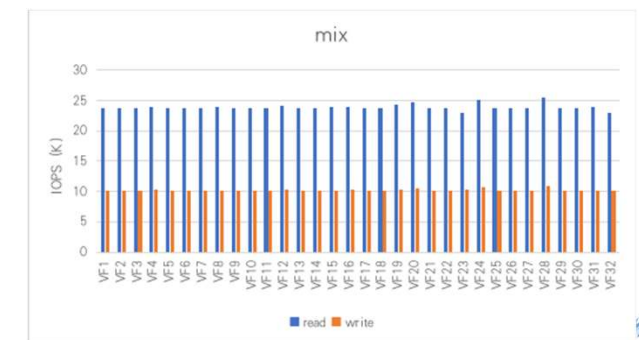
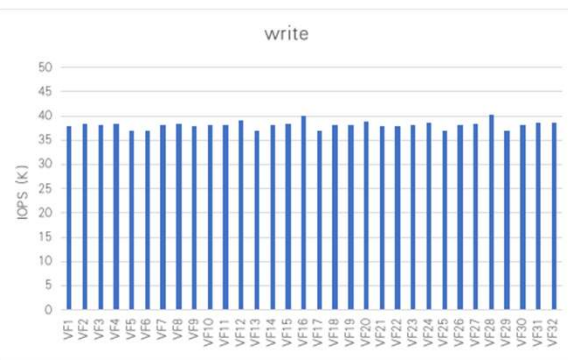
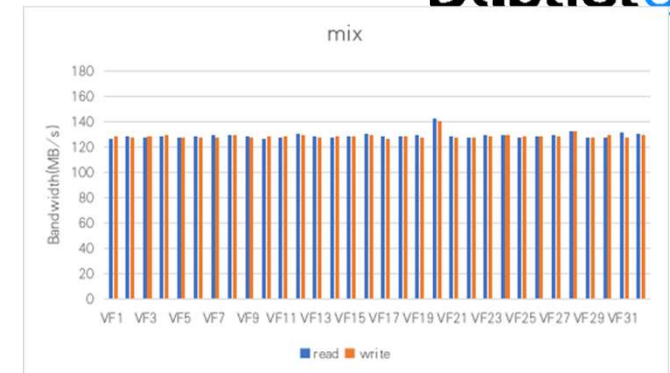
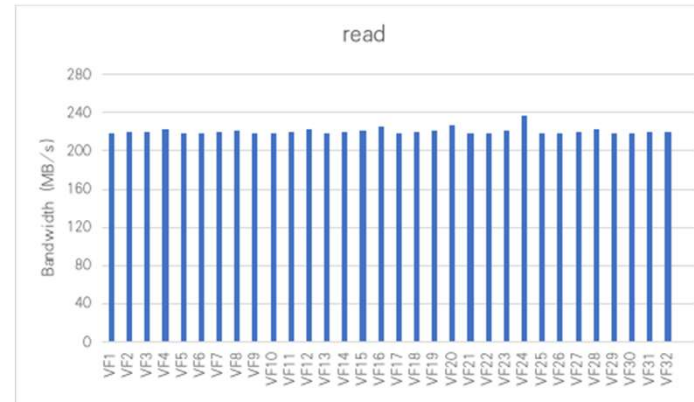
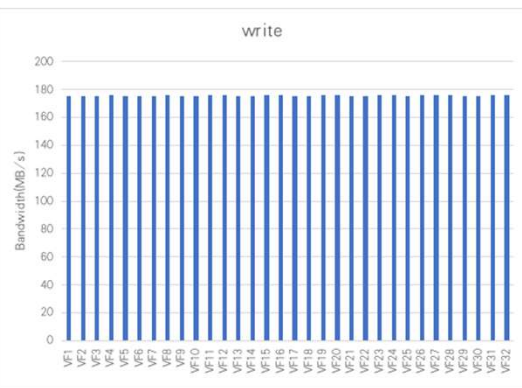
DapuStor SR-IOV Brief Specifications	
Capacity	1.6TB - 15.36TB
Form Factor	E3.S /U.2
Interface	PCIe 4.0 x4, NVMe1.4
VF	Up to 32
NS	Up to 32
QoS	Configurable
VF I/O Determinism	Support
Application	Cloud Service Provider
Better TCO	No need of SR-IOV bridge, easy to adopt, virtual storage for Cloud service

SRIOV – 32 VF balanced performance



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- Cooperate with host
 - Reduce IO stack's hierarchy
- Lower storage cost
 - reduced OP and device resources
- Allowing the host to contribute to data placement
 - Expose Sequential write constraint of media
 - Nand die erase blocks on SSDs
- Leads to device side optimizations
 - Improved device capacity
 - Lower OP
 - Remove device data movement(GC)
 - Improved latency and throughput
 - Better support for multi-tenant workloads
 - Host data-placement

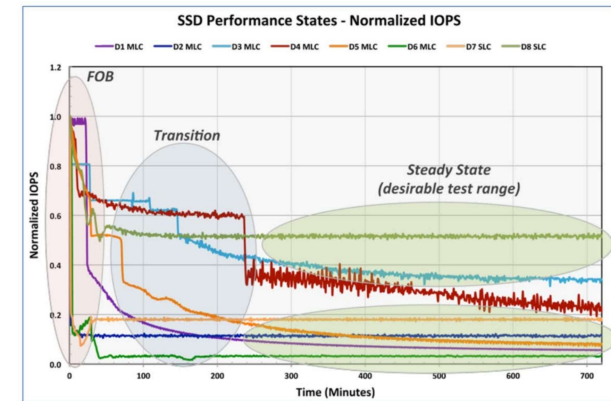
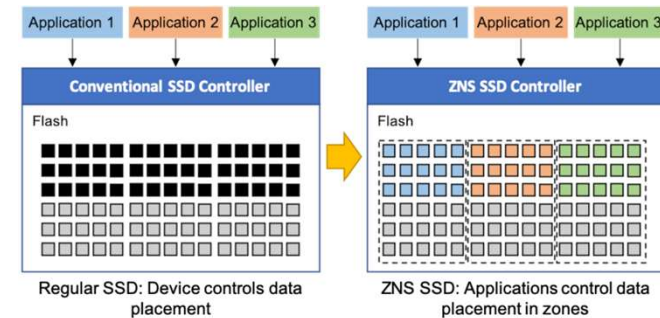


Figure 1-1 – NAND-based SSS Performance States for 8 Devices (RND 4KiB Writes)



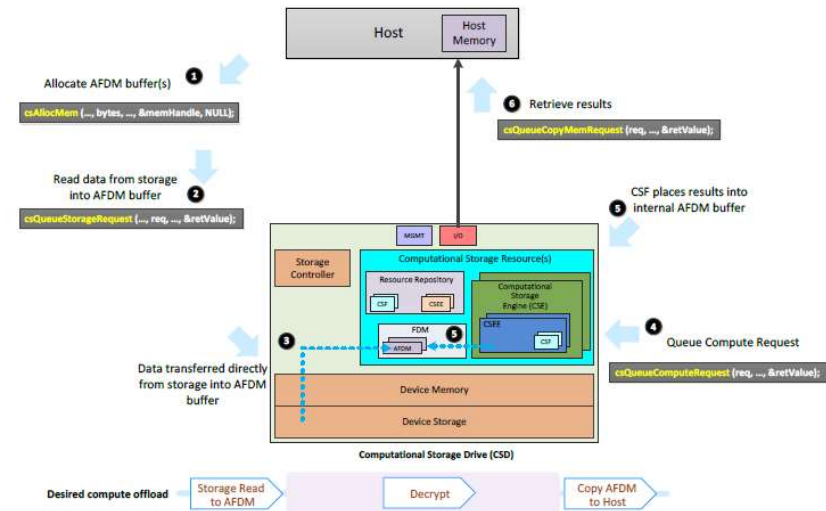
CSD - Ecosystem



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52 Participating Companies - 258 Member Representatives

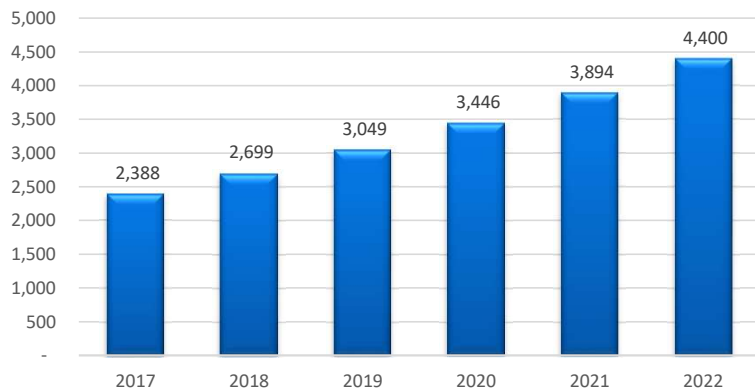


CSD - Spec

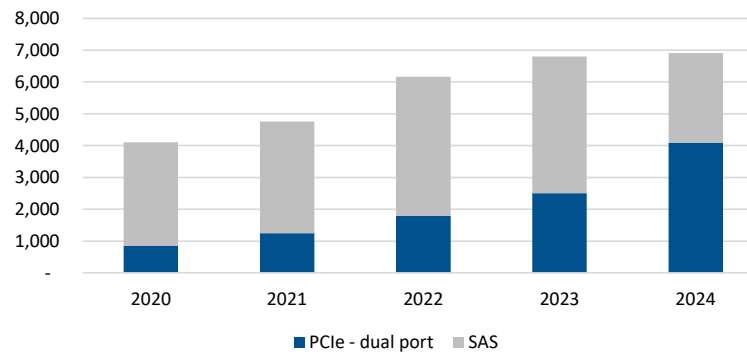
DapuStor CSD Brief Spec	
Capacity	1.6TB - 15.36TB
Scheduler	2022 Q4 MP
Platform	DapuStor In-house controller (DPU600)
Form Factor	E3.S /U.2
Interface	PCIe 4.0 x8, NVMe1.4, w/ dual port
CSD Function 1	Compression
CSD Function 2, 3...	TBD

Dual Port – Storage key features

China Storage system(M\$)



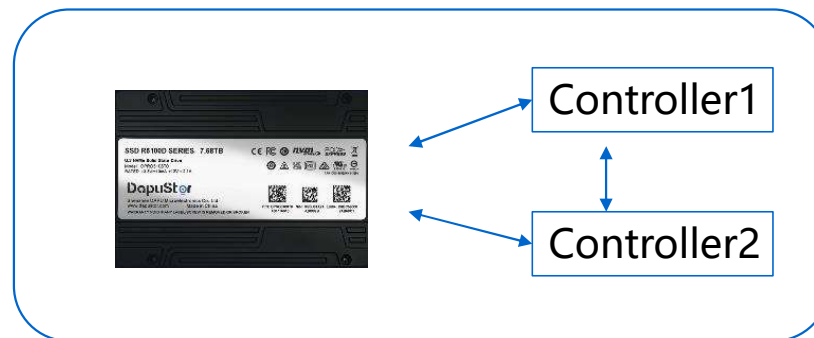
Storage system SSD(Kpcs):
SAS SSD -> PCIe - Dual Port SSD



PCIe NVMe:
Ecosystem &
performance

60% @2024 for
Storage system

China Storage-system market is growing fast



SCM - Xlenstor: 'XL-FLASH'+ 'Excellent'+ 'Storage'

DapuStor Xlenstor (SCM SSD)



Xlenstor Haishen3-XL

PCIe G3x4 U.2/AIC
750/1600GB
20µs RR Latency
30 DWPD
XL-FLASH
2nd Gen Smart-IO

Xlenstor Gen2

PCIe 2*G4x2; G4x4
U.2
400/800/1600GB
18µs RR Latency
60 ~ 100 DWPD
XL-FLASH
3rd Gen Smart-IO



Xlenstor Gen3

PCIe 2*G5x2; G5x4
E3.S/E1.S
800/1600/3200GB
18µs RR Latency
30-60 DWPD/1Mon retention
XL-FLASH Gen2
4th Gen Smart-IO

 Check it in KIOXIA Booth
307#

Xlenstor: The fastest SLC based SCM in the world!

	Intel P4800X	DapuStor Xlenstor	DapuStor Xlenstor Gen2	Samsung SZ1735a	Intel P5800X
Media	3D Xpoint (Gen.1)	KIOIXA XL-FLASH	KIOIXA XL-FLASH	2 ND Gen Z-NAND	3D XPoint (Gen.2)
Capacity	375GB~1.5TB (OP 20%)	750GB, 1.6TB	400GB ~ 3.2TB	800GB~3.2TB	400GB~1.6TB
Form Factor	HHHL, U.2	U.2	U.2	U.2, HHHHL	U.2
Interface	PCIe Gen3x4	PCIe Gen3x4	PCIe Gen4x4 w/ dual port	PCIe Gen4x4	PCIe Gen4x4
Sequential Read	2.4GB/s	3.5GB/s	7GB/s	7GB/s	> 7GB/s
Sequential Write	2.0GB/s	3.1GB/s	6GB/s	4.1GB/s	>5GB/s
Random Read (4KB)	550k IOPs	830kIOPS	1800k IOPS	1800k IOPS	1500K
Random Write (4KB)	500k IOPs	350kIOPS	650/1200k IOPS	330k IOPS	1150K
Random Read Latency	10us	20us	18us	<20us	6us
Random Write Latency	10us	9us	7us	<15us	7us
DWPD	30/60	30	60 ~ 100	30/60(DR 1month)	100
QoS 99.9%/R:W=7:3	<100us	~150us	< 150us		
Lifetime	5yrs	5yrs	5yrs	5yrs	5yrs

DapuStor Xlenstor Gen2 Review



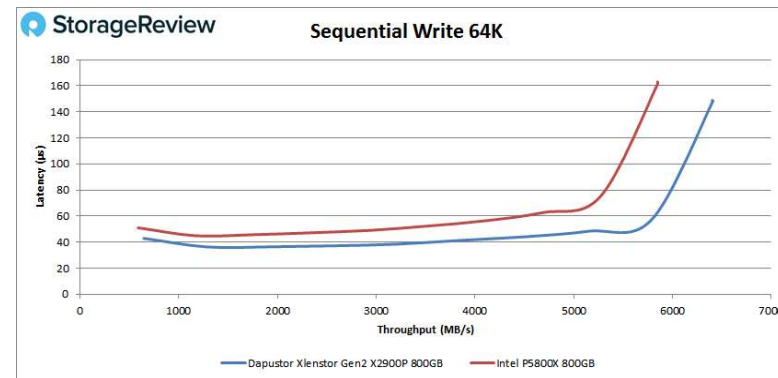
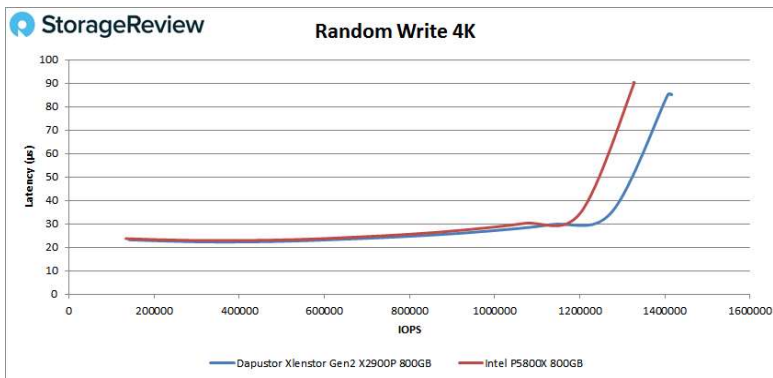
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As you can see from the results above, both the Intel and Dapustor drives are incredibly fast. Intel has been unbeatable so far in the SCM drive category. However, the X2900P **pretty much rides on the Intel P5800X** throughout our review. **It even notches a few wins in 4K and 64K write performance, which is very impressive.** While the P5800X has been the dominant player all year, the Dapustor X2900P is a worthy challenger.

--By StorageReview

<https://www.storagereview.com/review/dapustor-x2900p-scm-ssd-review>



DapuStor Haishen5

First Market of PCIe 5.0 E1.S Enterprise & DC SSD!

Co-release with Marvell, NOW!

DapuStor Haishen5 – First market of PCIe 5.0 E1.S

NEW Product Launch!

The Latest Form Factor

Support the latest EDSFF E1.S, E3.S and U.2

Low Latency

4K Read/Write Latency: 62/9 μ s

PCIe 5.0

Built on Marvel PCIe Gen5 enterprise controller

BiCS6 3D NAND Flash

Paired with BiCS6 eTLC/QLC from KIOXIA





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 Check it in Marvell Booth 607#



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THE END

M a k i n g D a t a S t o r a g e S m a r t e r