

Flash Ahead

Power and IBM Flash – worlds fastest processor with the worlds fastest storage



Texas Memory Systems, Inc.
An IBM Company



Agenda

- Why Flash?
 - Flash storage system product details
- Reference Configurations
 - Attach variations for Power Servers
- Impact to the applications/workloads
 - Low Latency Value Proposition



What our clients struggle with....

In the last 10 years:

- CPU speed: increased roughly **8-10x**
- DRAM speed: increased roughly **7-9x**
- Network speed: increased roughly **100x**
- Bus speed: increased roughly **20x**
- Storage speed: increased *only* **1.2x ... until now 35X**

All parts of the infrastructure improve when storage improves – use Flash as an accelerator!!



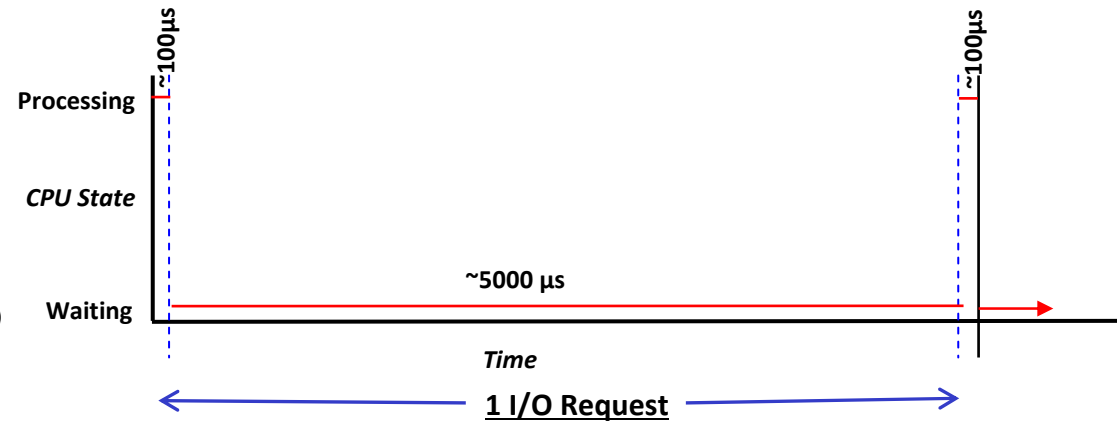
RamSan Benefit



I/O Serviced by Disk

1. Issue I/O request ($\sim 100 \mu s$)
2. Wait for I/O ($\sim 5,000 \mu s$)
3. Process I/O ($\sim 100 \mu s$)

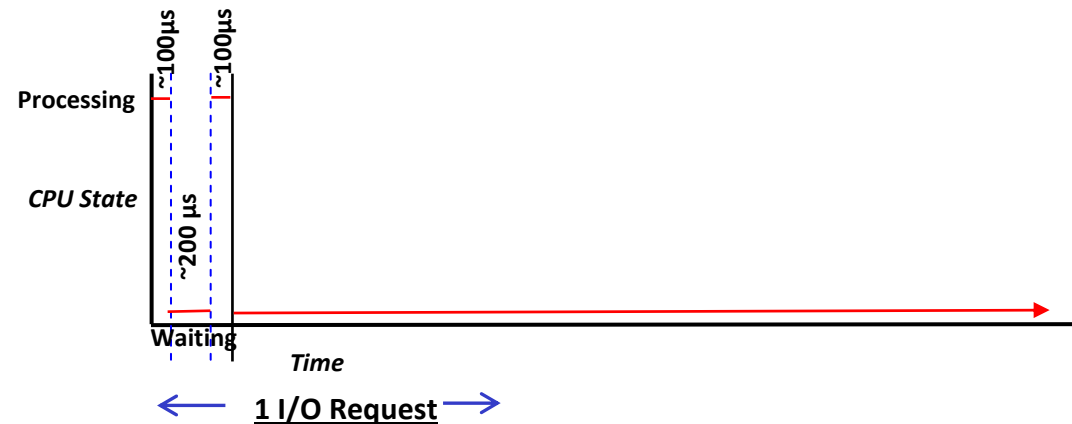
- Time to process 1 I/O request $5,200 \mu s$ ($200 \mu s + 5,000 \mu s$)
- CPU Utilization = $\sim 4\%$ (Wait time / Processing time = $200 / 5,200$)



I/O Serviced by RamSan

1. Issue I/O request ($\sim 100 \mu s$)
2. Wait for I/O ($\sim 200 \mu s$)
3. Process I/O ($\sim 100 \mu s$)

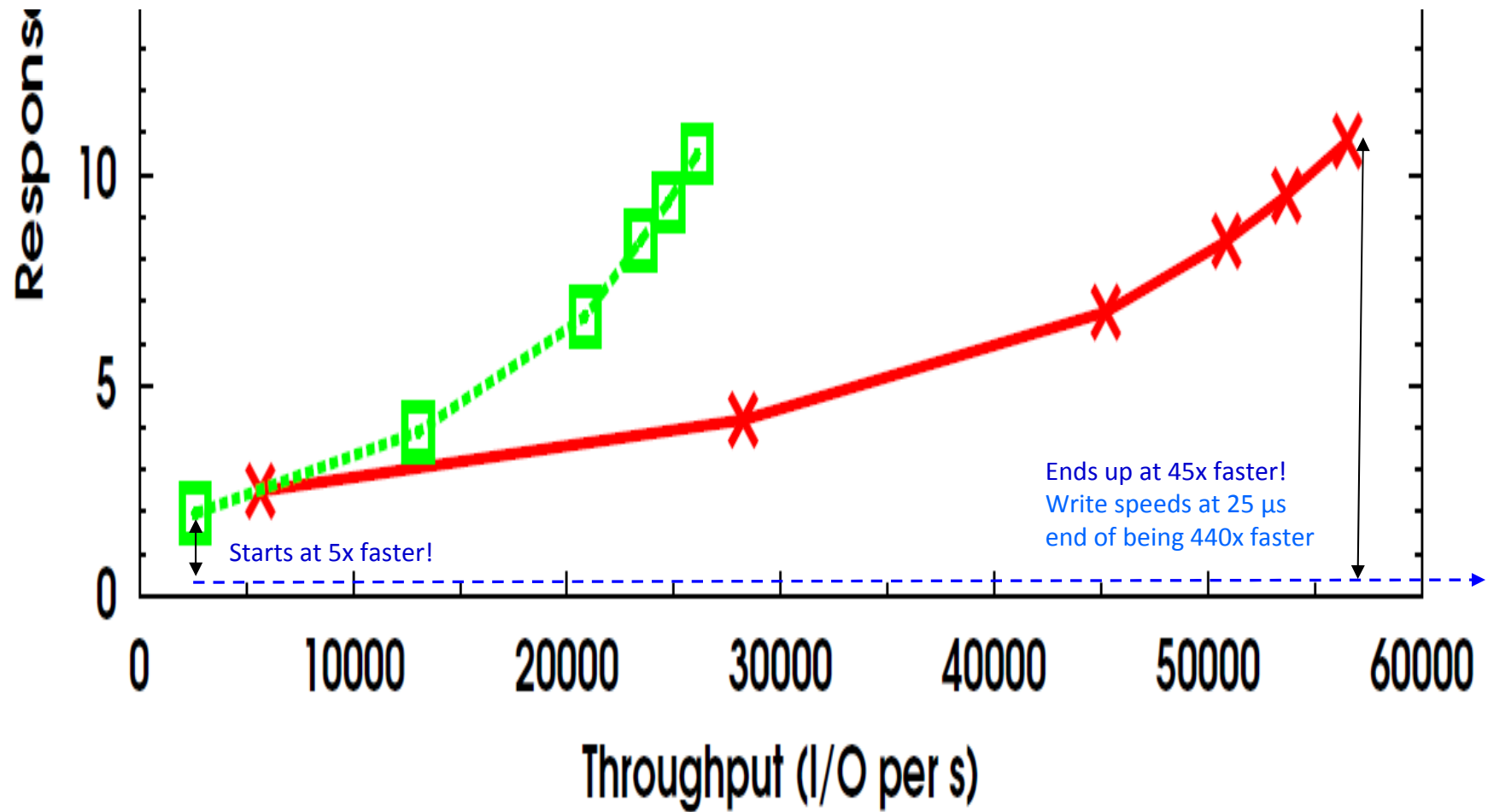
- Time to process 1 I/O request: $400 \mu s$ ($200 \mu s + 200 \mu s$)
- CPU Utilization: $\sim 50\%$ (Wait time / Processing time = $200 / 400$)



**12X Application benefit by
only changing storage latency!**



RamSan Benefit(2)



Traditional HDD system
Traditional system w SSD
Ramsan




Solution: In the Enterprise.....

Appliances



RamSan-710/720

SLC FLASH-Based
SAN Attached



RamSan-810/820

eMLC FLASH-Based
SAN Attached

- **Microseconds, not Milliseconds**
- **Supplement RAID, don't replace**
 - Hot files on RamSan
 - RAID gets faster
 - More RAID cache available
 - CPU utilization rises
- **Consolidate / Reduce**
 - Servers
 - Recurring software costs
 - Power / Warranty / Mgmt costs
- **Dedicate VMFS/VMDK to RamSan LUN**

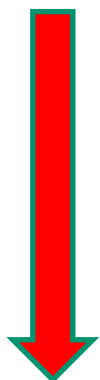


What Makes the RamSan a Better SSD?

Microseconds, not Milliseconds....

Database: Logs (redo/undo)
Tables
Temp files
Indexes

Represent about 80% of disk or I/O activity, but only about 2-5% of all their data . Shared Storage vs. Server dedicated



Tiering Storage According to Use/Speed

RamSan



60/1000's of a **milliseconds**
(60 **MICRO**seconds)

RAID Cache



1 millisecond

SSD



2-4 milliseconds

RAID



6-10 milliseconds

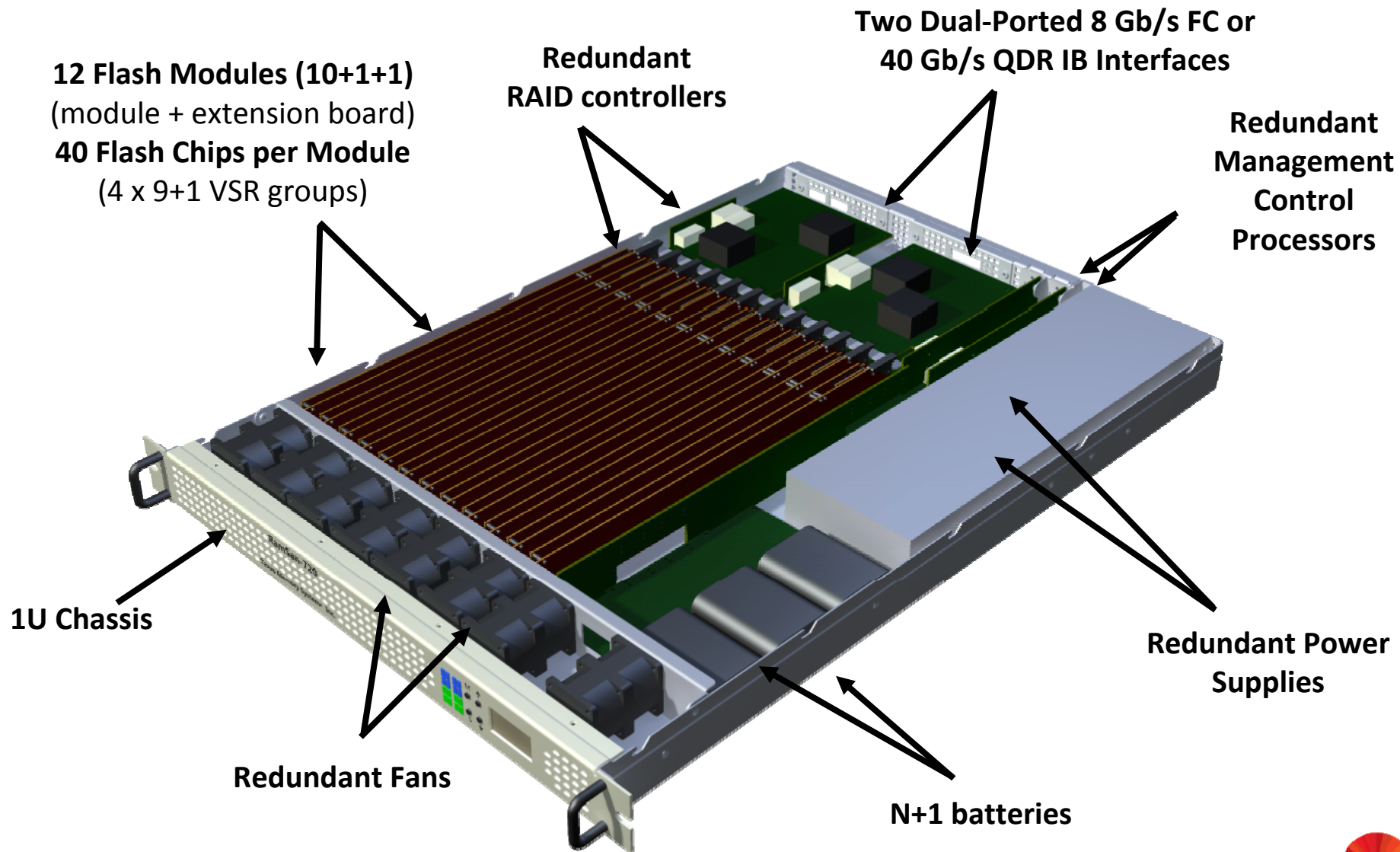
Tape



Slow

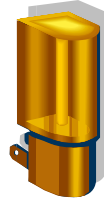


RamSan-720/820 Architecture



Energy and TMS

- 5 watts for a 100GB LUN
 - Same as a child's night light



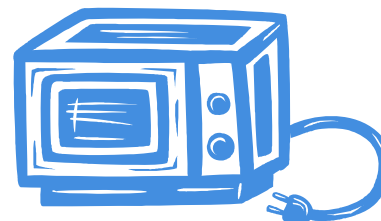
- 100 watts for 100,000 IO operations per second
 - Same as a traditional 100W bulb



- 600 watts for 6 GB/S of throughput
 - Same as a home stereo system



- 110v power at 30 pounds
 - Same as an average microwave oven



Focus on IBM/TMS Shared Flash Systems



RamSan-710/810
SLC (710) / eMLC (810) Flash
100/25 us R/W Latency
1-5 or 2-10 TB
450K/400K IOPS (4K)
5/4 GB/s
1U rackmount, 4x 8Gb FC ports, 4x 40Gb QDR InfiniBand
List Price Range (NA) \$49K- \$149K

Model	TB	Flash	Price
710	1,2,3,4, 5	SLC	45-149K
810	2,4,6,8, 10	eMLC	45-149K
720	5 or 10	SLC	174-325K
820	10 or 20	eMLC	174-324K

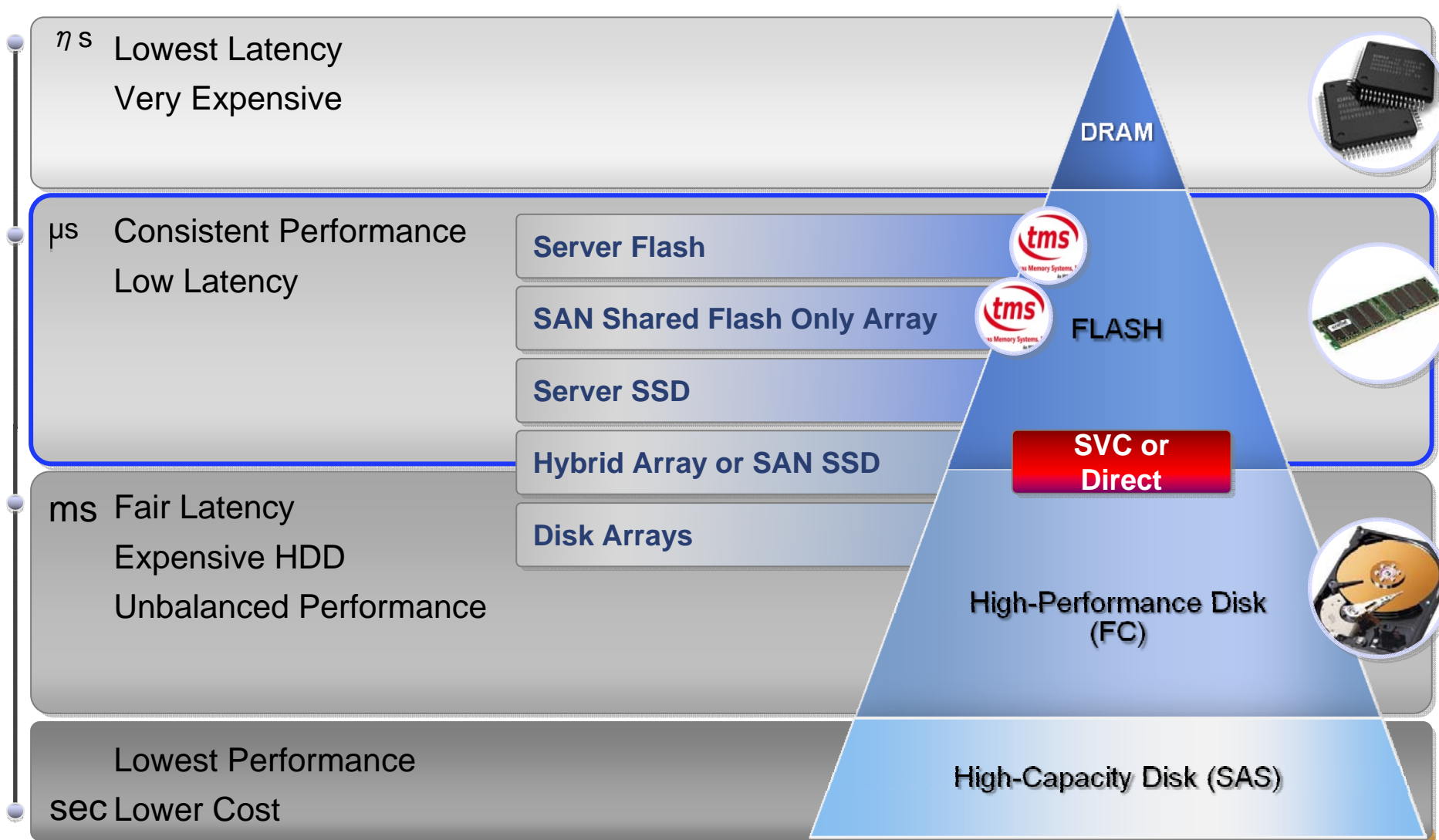
RamSan-720/820
SLC (720) / eMLC (820) Flash
100/25 us R/W Latency
5, 10, or 20 TB w/HA (6/12/24 TB non-HA)
500K/450K IOPS (4K)
5/4 GB/s
1U rackmount, 4x 8Gb FC ports, 4x 40Gb QDR InfiniBand
List Price Range (NA) \$174K- \$324K



Reference Configurations



RamSan Competitive Positioning



Reference Configurations

- **Direct Attach**
 - Fibrechannel cabled directly from AIX/VIOS HBAs into RamSan FC ports
 - With 4 FC ports, allows 4 servers to go fast, or two with high availability
- **Paired Direct Attach**
 - Similar to above, but two RamSan's with AIX/VIOS employing mirrored volume groups
- **SAN Attached**
 - 4 ports of RamSan into Brocade/Cisco fabric switch
 - Dozens of Power servers then go fast
- **Paired SAN Attach**
 - Similar to above, but with two RamSan's with AIX/VIOS employing mirrored volume groups
- **SVC with paired RamSan**
 - Optimal performance from SVC
 - All the nines
 - Host offload of mirroring responsibility
 - Allows other SVC value props
 - Flash copy, thin provisioning, replication services, real time compression, easy tiering, Cloud management solutions



Low Latency Value Proposition



Key Client Messages for IBM Shared Flash Systems



Application Architects/Owners, Line of Business Managers	CIOs, IT Directors, Other Executives
<ul style="list-style-type: none"> •Cut user complaints •Scale to more users •Cut response times •Simplify solutions 	<ul style="list-style-type: none"> •Best economics: quick ROI, low TCO, potential license cost savings •Low power and space requirements •Best support, especially vs. startups
Database Administrators	Infrastructure Owners (Server or Storage Teams)
<ul style="list-style-type: none"> •Remove I/O waits •Cut query times •Speed up applications •Avoid vendor lock-in (vs. Exadata) 	<ul style="list-style-type: none"> •Easy integration with existing infrastructure •Low power and space requirements •Best support, especially vs. startups

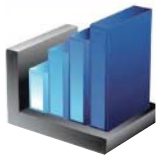


Application Sweet Spots: *Do More, Do it Faster!*



OLTP Databases

- Financial, gaming, real-time billing, trading, real-time monitoring, query acceleration (DB2/Oracle), etc.



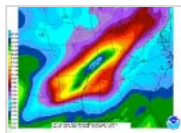
Analytical applications (OLAP)

- Business intelligence, batch processing, ERP systems, reporting, massive data feeds, etc.



Virtual Infrastructures

- VDI, Consolidated virtual infrastructures, user profiles, etc.



HPC/Computational Applications

- Simulation, modeling, rendering, FS metadata, scratch space, video on demand, thread efficiency, etc.



Cloud-scale Infrastructures

- On-demand computing, content distribution, web, caching, metadata, GPFS, active file management, etc.

Financial

Government

E-Commerce

HPC

Telecom

IBM Flash Storage- What's New

Visit our new IBM Website at:

ibm.com/systems/storage/flash

Find product information, case studies and more!

Other questions?

AskTMS@us.ibm.com





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Thank You

