

A blurred city street at night with light trails from cars and buildings. Overlaid on the image are horizontal lines of binary code (0s and 1s) in various colors (red, orange, yellow, green, blue) that appear to be moving across the frame.

Flash: The Great Disruptor

Kevin Conley

SVP and CTO

Flash Memory Summit, August 11, 2015

SanDisk®



Forward Looking Statements

This presentation contains certain forward-looking statements.

Any statement that refers to expectations, projections or other characterizations of future events or circumstances is a forward-looking statement, including those relating to market growth for flash and SSD, industry trends including the increased adoption of and demand for flash and SSD in various devices and pricing trends, enterprise applications and data centers, future memory technology, technology transitions and future products, including 3D NAND and its capacities, capabilities, scalability, performance, cost and timing of commercial availability, as well as increased SSD capacities and emerging storage class memory. This presentation also contains information from third parties, which reflect their projections as of the date of issuance of those statements.

Actual results may differ materially from those expressed in these forward-looking statements due to factors detailed under the caption "Risk Factors" and elsewhere in the documents we file from time to time with the SEC, including our annual and quarterly reports.

We undertake no obligation to update these forward-looking statements, which speak only as of the date hereof or the date of issuance by a third party, as the case may be.

Waves of Disruption

Flash has changed application media repeatedly by reaching new levels of cost for utility



1995



2000



2005

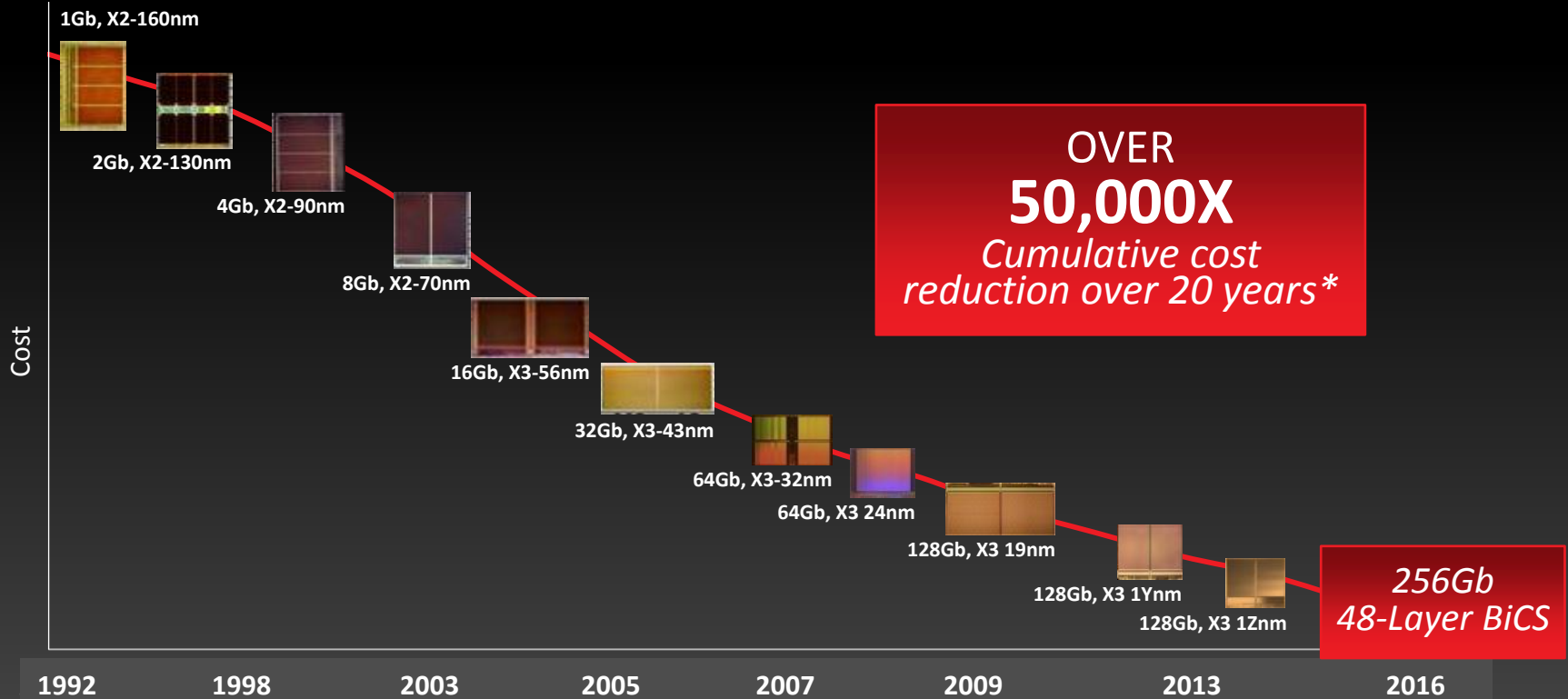


2010



2015

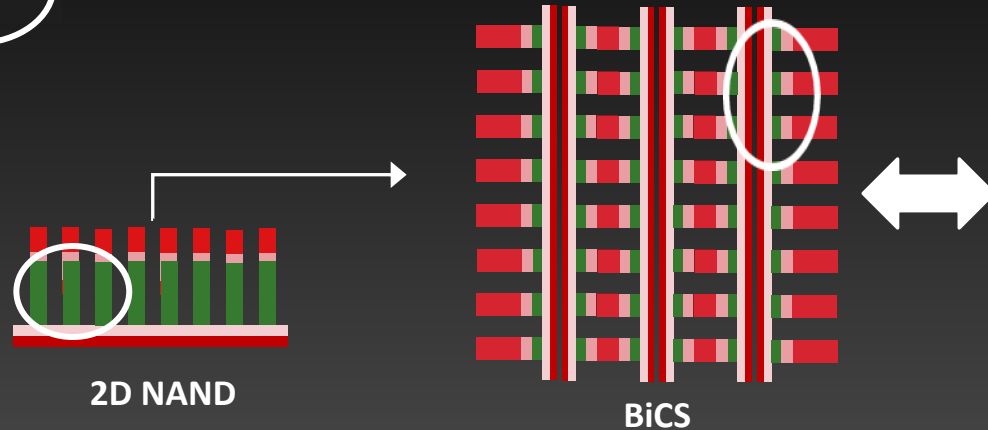
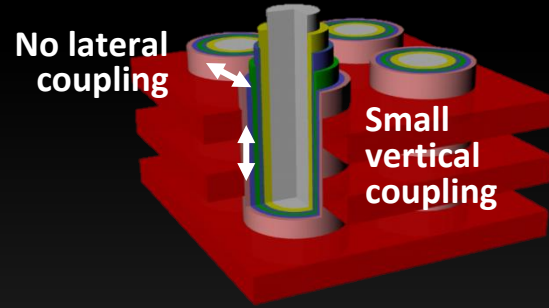
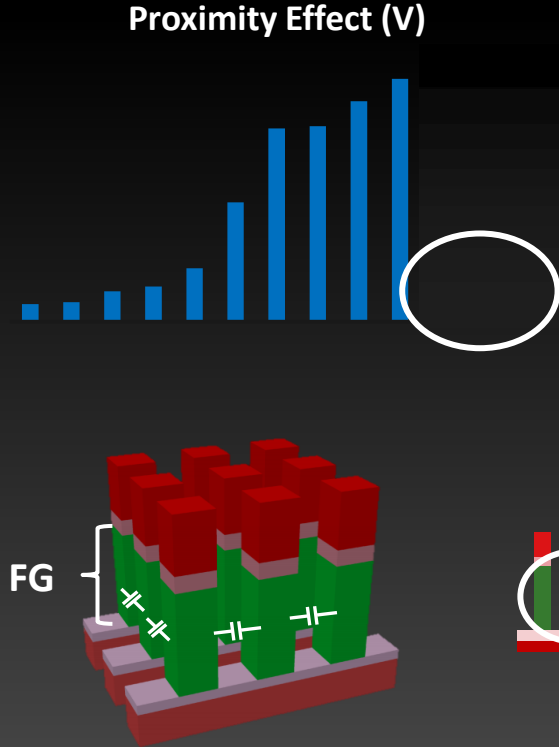
Outpacing Moore's Law



Note: Images are not to scale

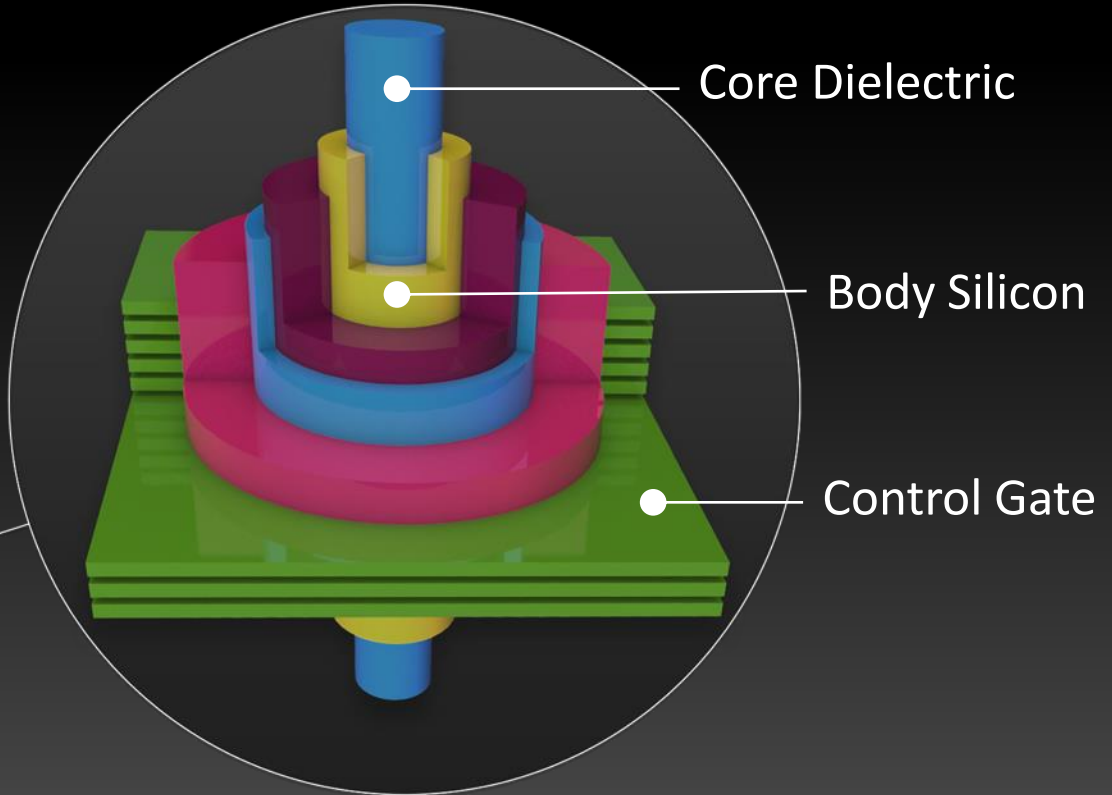
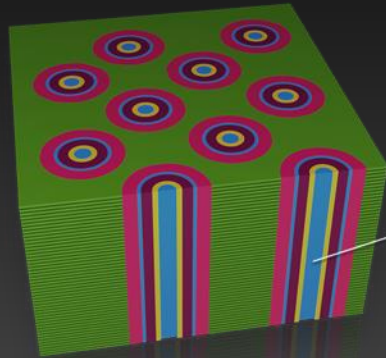
Based on historical SanDisk NAND pricing 1992

3D NAND Flash: Tall is the New Small



Overcoming 2D Scaling Challenge

3D NAND Flash



Flash in Mobile Devices

Putting the power of business in phones and tablets

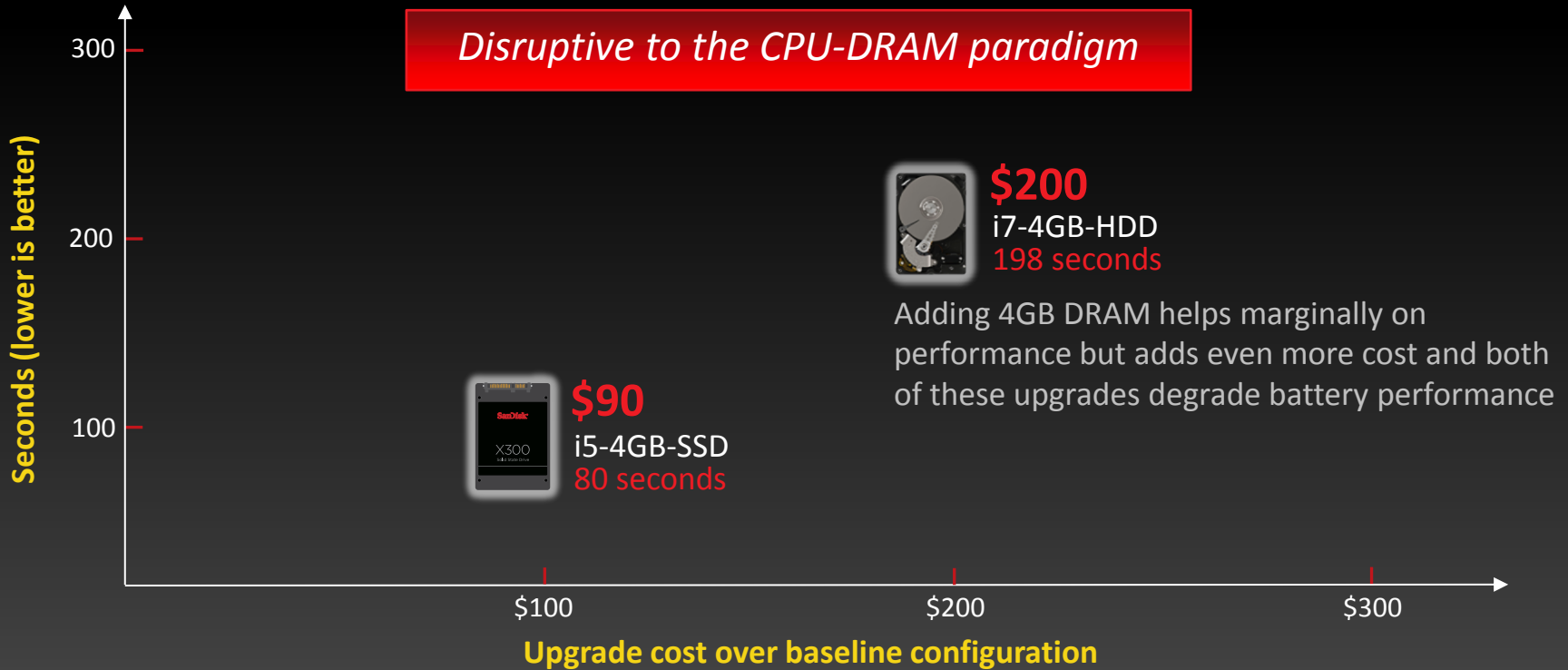


Flash in the PC

Changing form factor, user experience, cost and speed of business



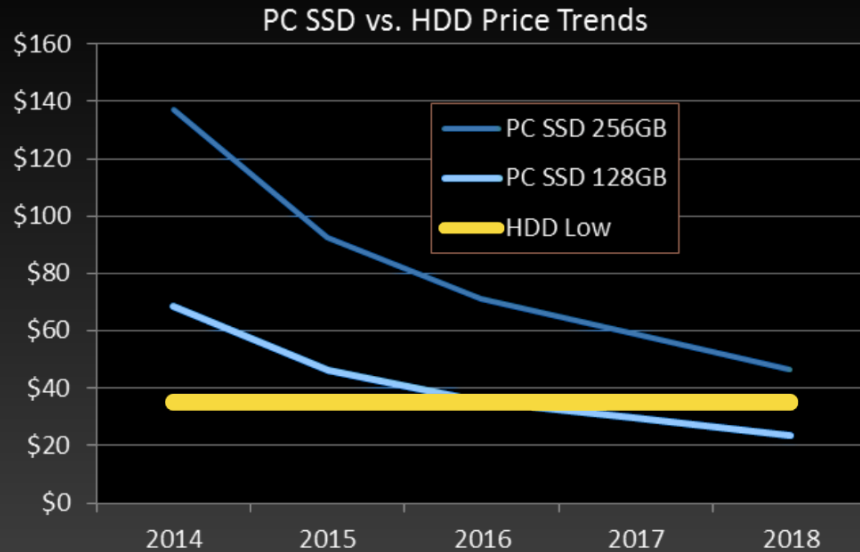
Flash in the PC



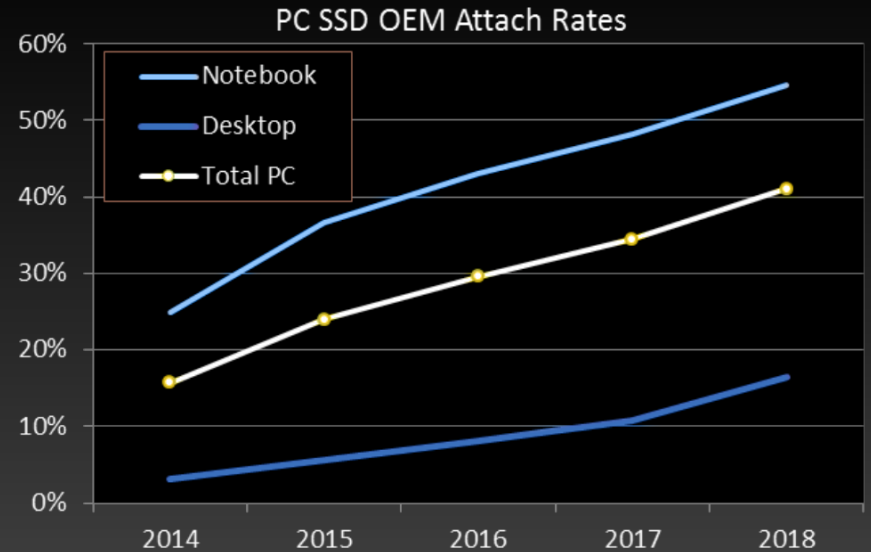
Source: Lenovo T450, May 2015

HDD's \$40 Problem

**Inflection point reached
when cost of utility drops below HDD**



**Driving an increased rate of
SSD adoption into PCs**



Source: Gartner, April 2015



Data Center: The Next Wave

Flash Meets Key Data Center Requirements

Low Power



Extreme Performance



Reliable



Scalable



Breakthrough Economics



Density Matters

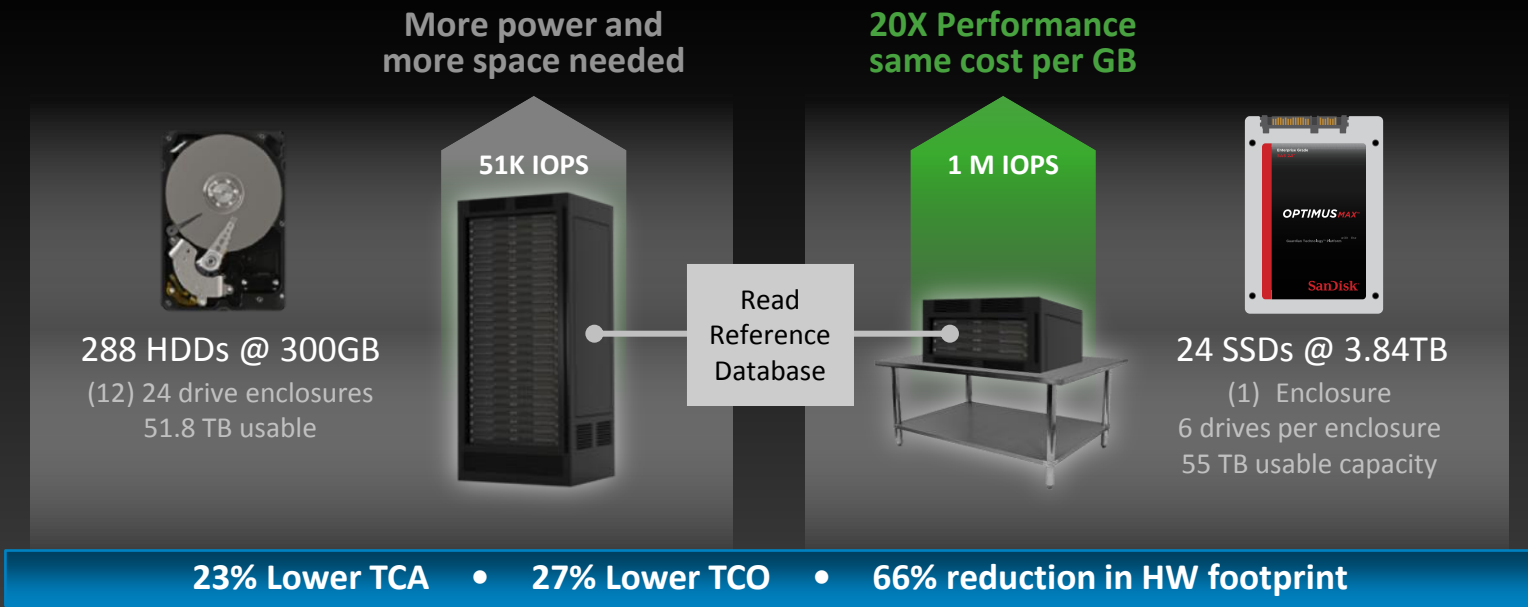
Beyond just faster, cooler, and more power efficient SSDs



SanDisk Enterprise SSDs continue to deliver density growth while mission critical HDD density hits a wall

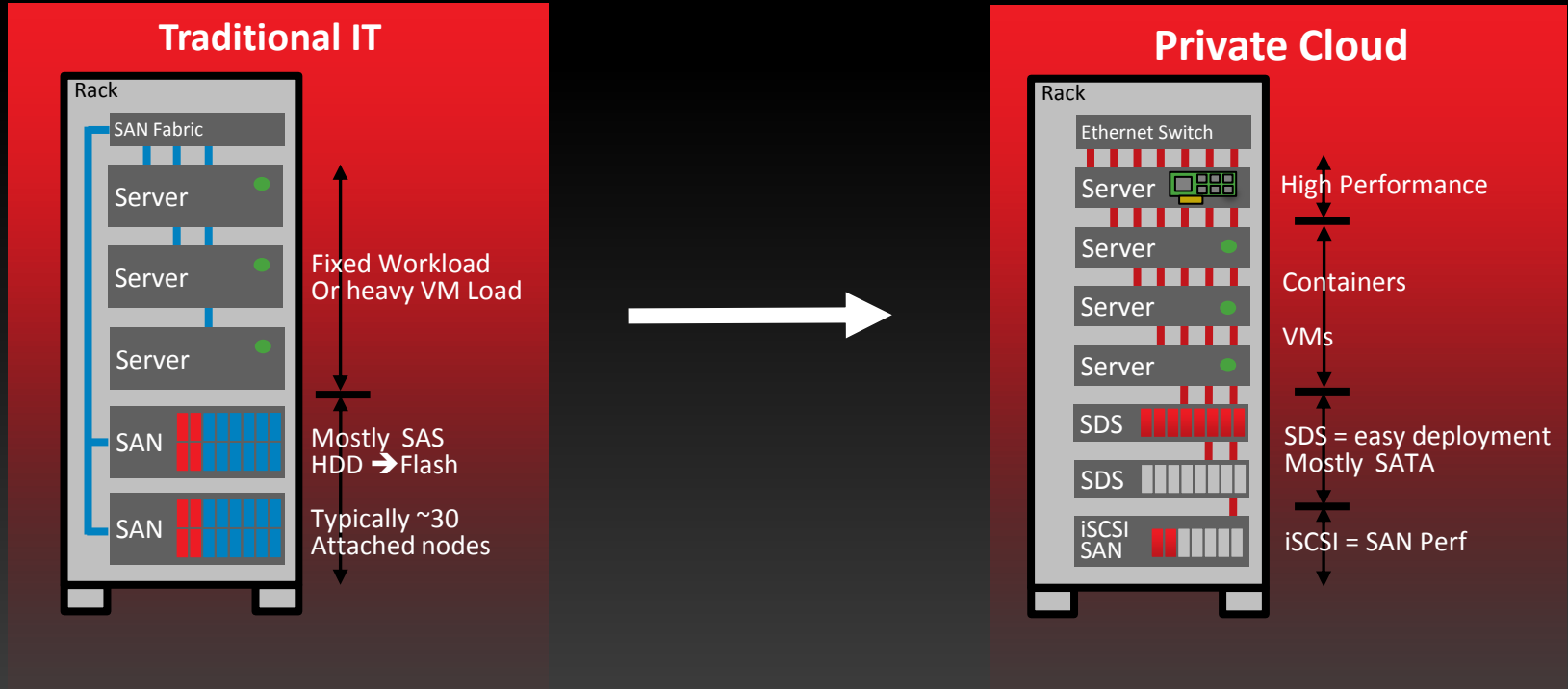
Flash Solutions Already Cost Less than HDDs

Example: 50TB minimum of database storage needed



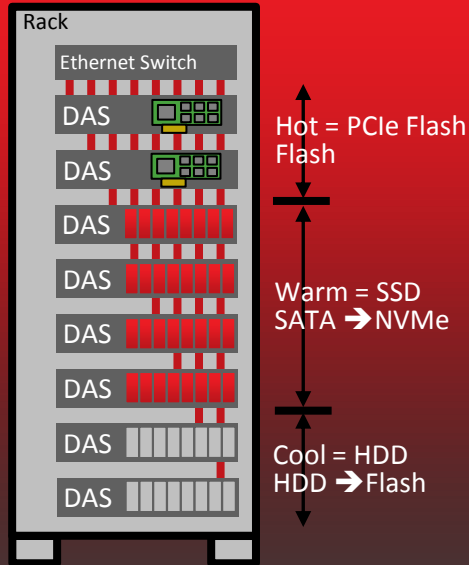
Source: Assumes 5 drive RAID 6 arrays. 100% reads at 4k transfer size. 75k IOPS per SSD and 300 IOPS per HDD. Assumes 4 enclosures needed for SSD access density and not for capacity housing. TCO based on 15.8 cents per KWh and 17% media maintenance costs per year.

Traditional IT Virtualization

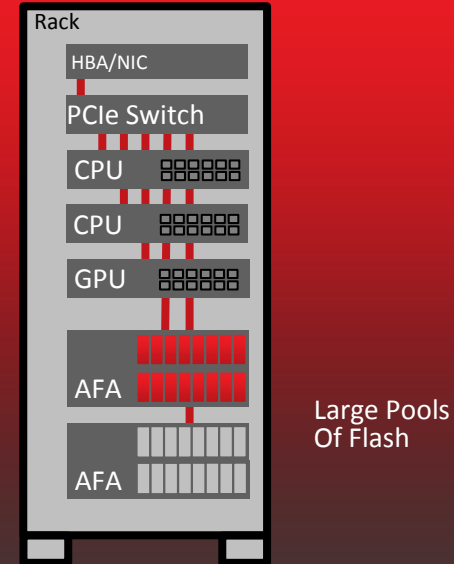


Hyperscalers Move to Disaggregated Storage

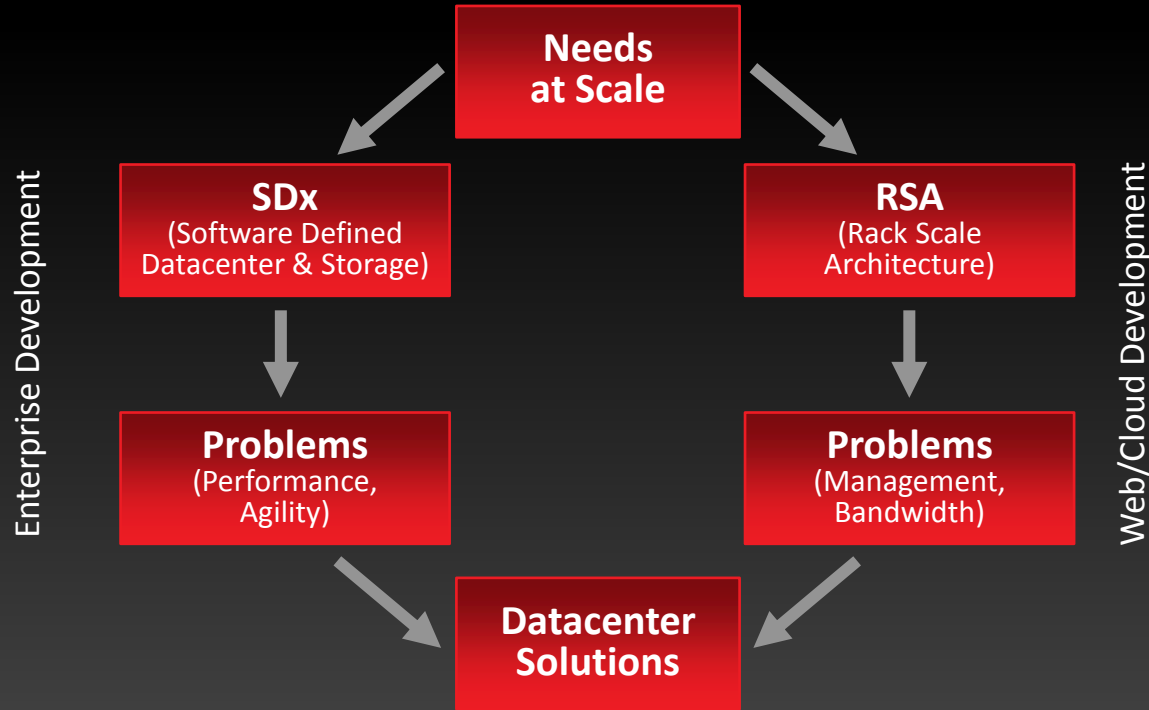
WebScale Architectures



Disaggregated RSA



Today's Datacenter Infrastructure is Changing



Changing Shape of Flash Storage

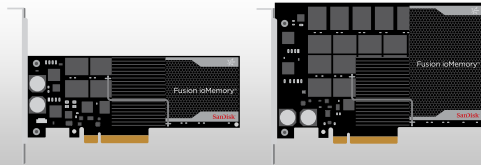
SSDs



- SATA
- SAS
- Reliability & Performance

Server & Storage Solution

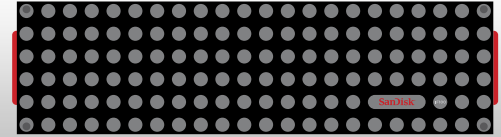
Fusion ioMemory™



- PCIe cards
- In-Server
- Highest App Performance
- High Capacity 6.4TB

**Highest Performance
Database & Log**

InfiniFlash™



- Block or File/Object
- 500TB
- Lowest \$/GB Storage

**Ultra-Dense Low
Cost Solution**

In Summary...

- **3D NAND** is upon us but **2D** still has legs
- Flash has achieved new **utility cost** enabling deployment at scale in today's data centers
- DC disaggregation will drive high **PB storage demand for EB class deployments**





Thank You

Expanding The Possibilities of Storage

Visit us @ Booth #207

<http://itblog.sandisk.com/>

© 2015 SanDisk Corporation. All rights reserved. SanDisk is a trademark of SanDisk Corporation, registered in the United States and other countries. InfiniFlash, Optimus MAX, and Fusion ioMemory are trademarks of SanDisk Corporation. Other brand names mentioned herein are for identification purposes only and may be the trademarks of their respective holder(s).

SanDisk®