


All-Flash Arrays Solve Storage Problems Cost-Effectively

August 7, 2014
Flash Memory Summit



0.40

Avg \$ / GB of MLC Flash

10.6

Avg cost / GB of All-Flash Arrays

Where does it all go?

MLC Flash	\$0.40
NAND Controller	\$2.00
Array HW+SW	\$5.00
Reseller	\$2.00
Distributor	\$0.70
Sales Team	\$0.50

42

Avg utilization rate of storage

25

Effective cost / GB of All-Flash Array

63

Multiple Effective Mark-up

Comparative Markups

Coffee Beans	2x
Cannabis	11x
Heroin	38x
Enterprise Arrays	63x
Cocaine	71x

▶ **What needs to happen**

- › All-flash SSD controller cost must come down
- › Array vendors must rationalize the cost of enclosures and software
- › Distribution must get more efficient or be eliminated
- › Utilization rates must be dramatically improved



**Increase
Performance**



**Improve
Reliability**



**Scale
Efficiently**



**Reduce
Energy**



**Reduce
Costs**



**Databases /
OLTP**

- › Reduce IO latency
- › Increase total IOps
- › Increase revenue





Virtualization /
VDI

- › Improve VM density
- › Eliminate boot storms
- › Record-low cost / VM





**Cloud
Public & Private**

- › Save energy & racks
- › Reduce OpEx by 95%
- › Improve storage SLA's





Technical / Analytics

- › Multiply throughput
- › Reduce job times
- › Speed time-to-market



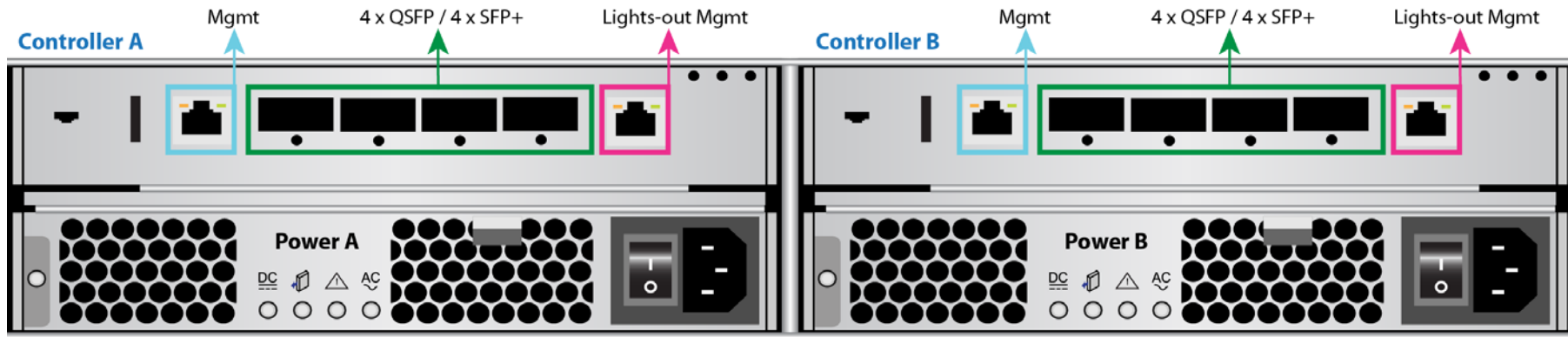
► Gemini All-Flash Array

- › Patent-pending design
- › From 3 TB to petabytes
- › No single-point-of-failure
- › Unified SAN and NAS
- › Ethernet, FC, or InfiniBand
- › As low as 50 μ sec latency
- › Up to 2 million IOps and 12 GBps
- › Ultra-efficient at < 10 W per TB
- › 10 year endurance with 1x nm MLC

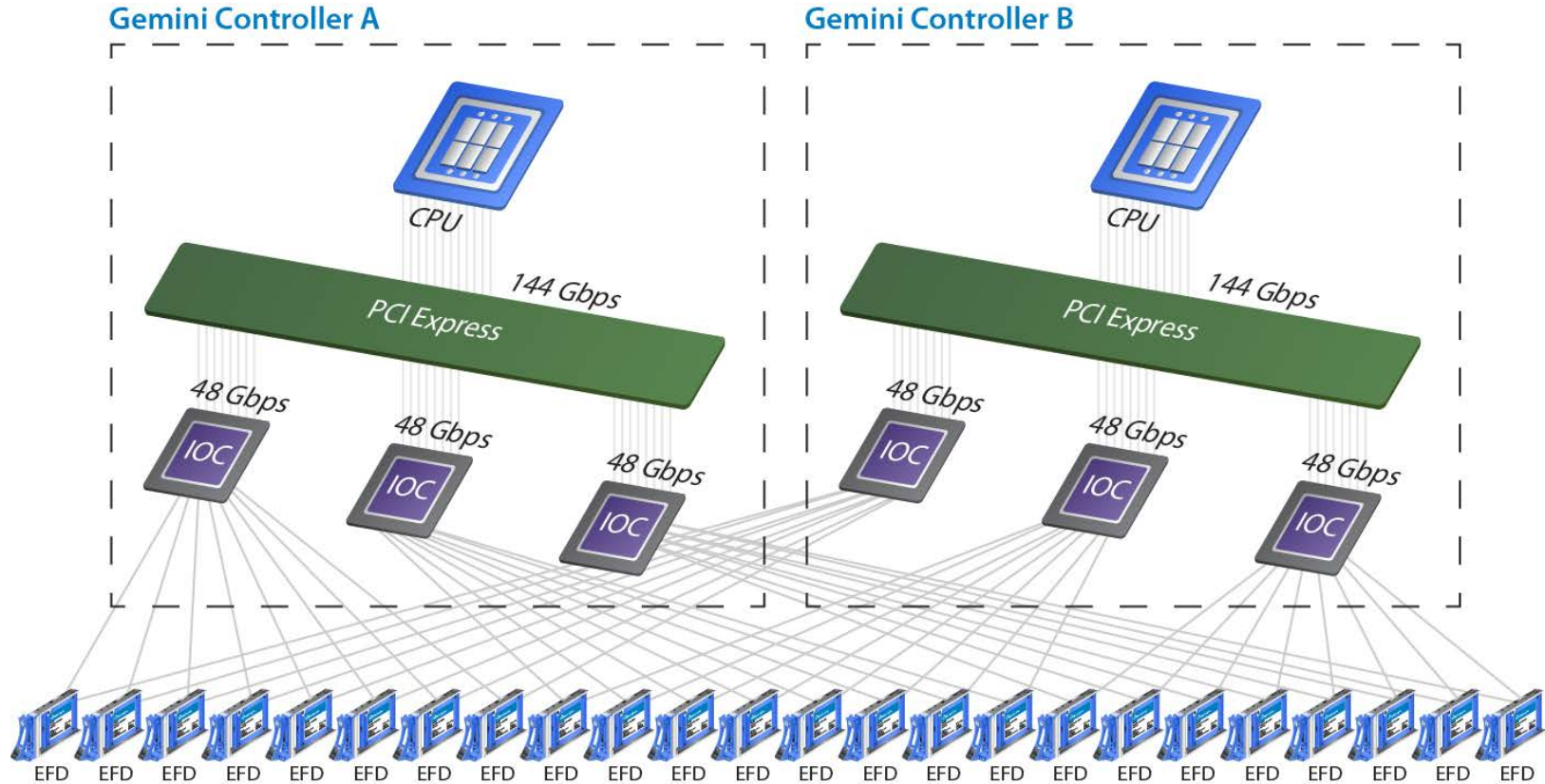


▶ Mission-critical High Availability

- › Hot-swap redundant system controllers and power supplies
- › Integrated lights-out management and drive sparing
- › Non-disruptive software updates and capacity expansion



Rear view of Gemini all-flash array

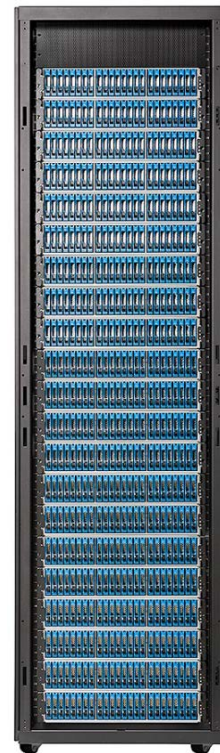


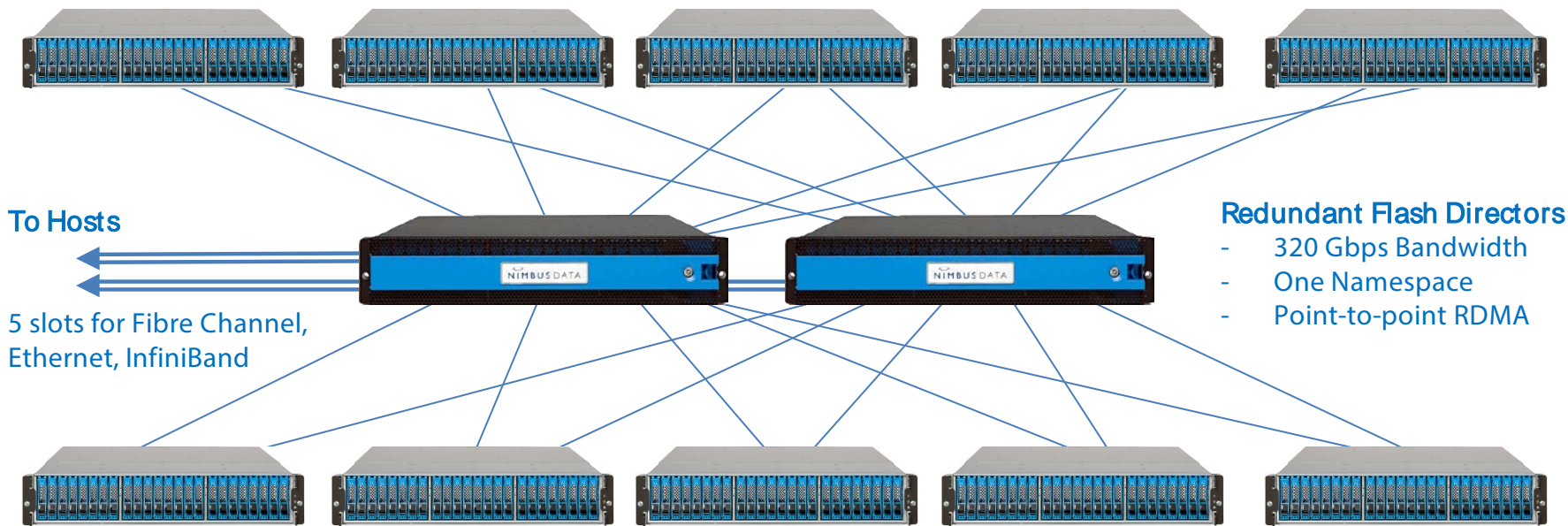
▶ Scale-Out Architecture

- › Achieve 1 PB of flash in a single namespace
- › Scale capacity and performance linearly to 10 nodes
- › Leverage automatic data integrity verification
- › Non-blocking RDMA backend for ultra-low latency

▶ Modular Design

- › **Directors:** smart switches aggregate capacity, distribute IO
- › **Nodes:** fault-tolerant flash capacity + hardware offload
- › **Control:** Centralized management and RAIN capabilities





Redundant Flash Directors

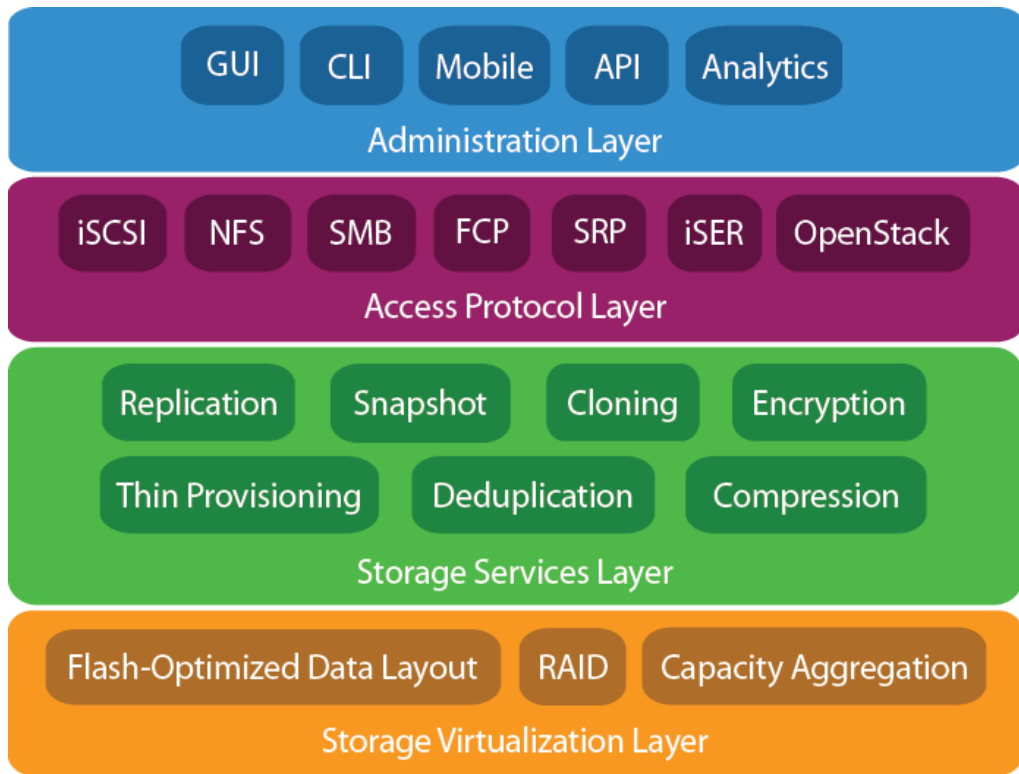
- 320 Gbps Bandwidth
- One Namespace
- Point-to-point RDMA

Up to 10 Flash Nodes

- 48 TB in 2U
- 32 Gbps, 400K IOps per Node

▶ HALO software

- › Industry's most full-featured software for flash memory arrays
- › Unified block and file in one platform
- › Extensive data protection and optimization features
- › **No license fees**
- › 10 minute setup



532

Number of systems sold

99

**Utilization Rates with Nimbus Data
without performance loss**

1

**Effective Cost per GB of
Nimbus Data all-flash arrays**

216

Booth Number to Find Us