



OBJECTIVE ANALYSIS

Semiconductor Market Research

OBJECTIVE ANALYSIS DETAILED REPORT

ENTERPRISE SSD TECHNOLOGY & MARKET OUTLOOK *April, 2014*

Abstract:

This fourth update to the acclaimed Objective Analysis enterprise SSD report: *Solid State Drives in the Enterprise*, expands on the earlier reports' in-depth look at the enterprise SSD market. This report fully explains the reason for SSDs' success in this market and predicts further developments and the interactions between various data center technologies and the SSD. The report includes a forecast by interface, and detailed information about the dynamics that drive this market.

Contents:

Executive Summary

SSDs in the Enterprise

- How Did We Get Here?

- SSDs vs. High-Performance HDD Arrays

Enterprise Needs by Application Type

- Transaction Processing Systems

 - Charge Card Processing

 - Reservations Systems

 - Algorithmic Trading

 - Currency Exchange and Arbitrage

 - Banking

 - Other Real Time Transaction Processing Systems

- Virtualized Systems

 - Virtualized Desktops

- Data Centers

 - Real-Time Data/Feed Processing

 - Contextual Web Advertising

 - Data Warehousing

 - Outlook Exchange Servers

 - Internet Server Caches

- Video

 - Video Production

 - Real-Time Video

 - Video on Demand (VOD)

 - Video Surveillance

- Science & Engineering

 - Nuclear Fission Models

 - Genome Sequencing

- Weather/Life Sciences
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- Electronic Design Automation & Project Modeling
- Aerodynamics Design
- Comparing SSDs to HDDs
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 - Comparing SSD and HDD Power States
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 - Side Impact on System Idle Times
 - Less Cooling
 - Reliability: HDDs vs. SSDs
 - De-Bunking HDD Reliability Myths
 - SSD Reliability: NAND Flash Endurance
 - When an SSD Dies
 - Fewer Devices = Fewer Failures
 - Saving Cost with SSDs
 - Less Memory
 - Reduced HDD Count
 - Server and Software Reduction
 - Power & Cooling Savings
 - Smaller Footprint
 - Shock & Vibration in the Enterprise
- SSD Weaknesses
 - Wear-Out
 - Internal Write Amplification
 - Very Slow Writes
 - Performance Inconsistencies

Larger Transfers are (Mostly) Slower than Smaller Ones
Read/Write Workload Impacts Speed
Past Demands May Slow Future Performance
Speed Varies with Use

Standards for SSDs

International Committee for Information Technology Standards (INCITS)
Serial ATA International Organization (SATA-IO)
Non-Volatile Memory Express (NVMe)
Storage Networking Industry Association (SNIA)
Joint Electron Device Engineering Council (JEDEC)
International Disk Drive Equipment & Materials Association (IDEMA)
Solid State Drive Alliance (SSDA)

Dampers to Adoption

Price per Gigabyte
Concerns about Wear
Alternatives to Using SSDs
Large DRAM
Enterprise HDDs
Short-Stroke or De-Stroke HDDs
RAID Systems & Striping

Managing SSDs

Managing Hot and Cold Data
Where Do SSDs Belong in the System?

Price Outlook

Conversion from SLC to MLC NAND
Reduced Overprovisioning
Smaller & Cheaper DRAM Buffers
Controller Prices Will Decline
Enterprise SSD Price Forecast

Total Cost of Ownership

SNIA TCO Model Omissions

Application Forecasts

Transaction Processing Systems
Virtualized Systems
Data Centers
Video
Science & Engineering

Combined Forecast

Combined Application Forecast
“Top-Down” Forecast
Forecast by Interface
SSD Interface Forecast Assumptions

Methodology