



# Flash in the PC

It's More Than Just SSD

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# Flash Is Making a Splash

- Performance
- Low power
- Robustness

↳ Solid State Drives (SSD) are becoming a replacement option for hard disk drives (HDD)

## Solid State Drives in the PC

- The first application: notebook PCs
  - SSD characteristics are a good fit
    - Typical notebook HDDs lag desktop counterparts in performance
    - Battery life and robustness are very important
- Longer term: desktop
  - Value proposition is tougher
    - Desktop PCs have higher performance HDDs, lower robustness and power savings requirements
    - SSDs will have to compete on performance
- SSDs still have their challenges...

## SSD Challenges

- Cost
  - Capacity
- } The acronym is really \$\$D

The good news: density and technology advancements help ease this over time

## A Hard Drive Reality Check

“The reports of my death are greatly exaggerated.”

- Mark Twain

- Hard drives still deliver value for many customers
  - Cost, capacity
    - Best \$/GB value for a long time to come
    - Highest capacities per form factor
  - Performance benefits
    - Good write speeds – a challenge for flash
    - Especially well suited to sequential reads & writes

## Another Flash Opportunity

- Flash enhancement to hard drives
  - Vista's ReadyDrive™, ReadyBoost™ feature sets are just the beginning
    - Hybrid hard drive, Intel's Turbo Memory are the first hardware embodiments
- NVMHCI
  - Defining a host controller interface specification for nonvolatile memory in the PC
  - Send draft spec review requests to [nvmhci@intel.com](mailto:nvmhci@intel.com)
- Standardization will enable more innovation
  - Application knowledge of flash in the system will encourage novel uses
  - Challenge: what are the next applications to take advantage of flash?



## Recommendations for Flash Devices in the PC

- Understand the usage model
  - Primary storage device in many cases
    - Read/write cycles much higher than typical removable flash cards
    - Data loss unacceptable
- Meet the reliability requirements of the application
  - Multilevel technology will require intelligent management to overcome its challenges
    - This area holds opportunities for invention

## Summary

- SSD is a compelling solution for some today, and more in the future
  - Positives: random read performance, robustness, power
  - Challenges: capacity, cost, write performance
- Flash enhancement of HDD is a near term opportunity
  - NVMHCI effort will help standardization
  - Help us innovate on solutions





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