

Don't buy NEW PCs

***Minimizing performance
degradation with dirty NANDs***

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(The information contained herein is subject to change without notice)



Introduction

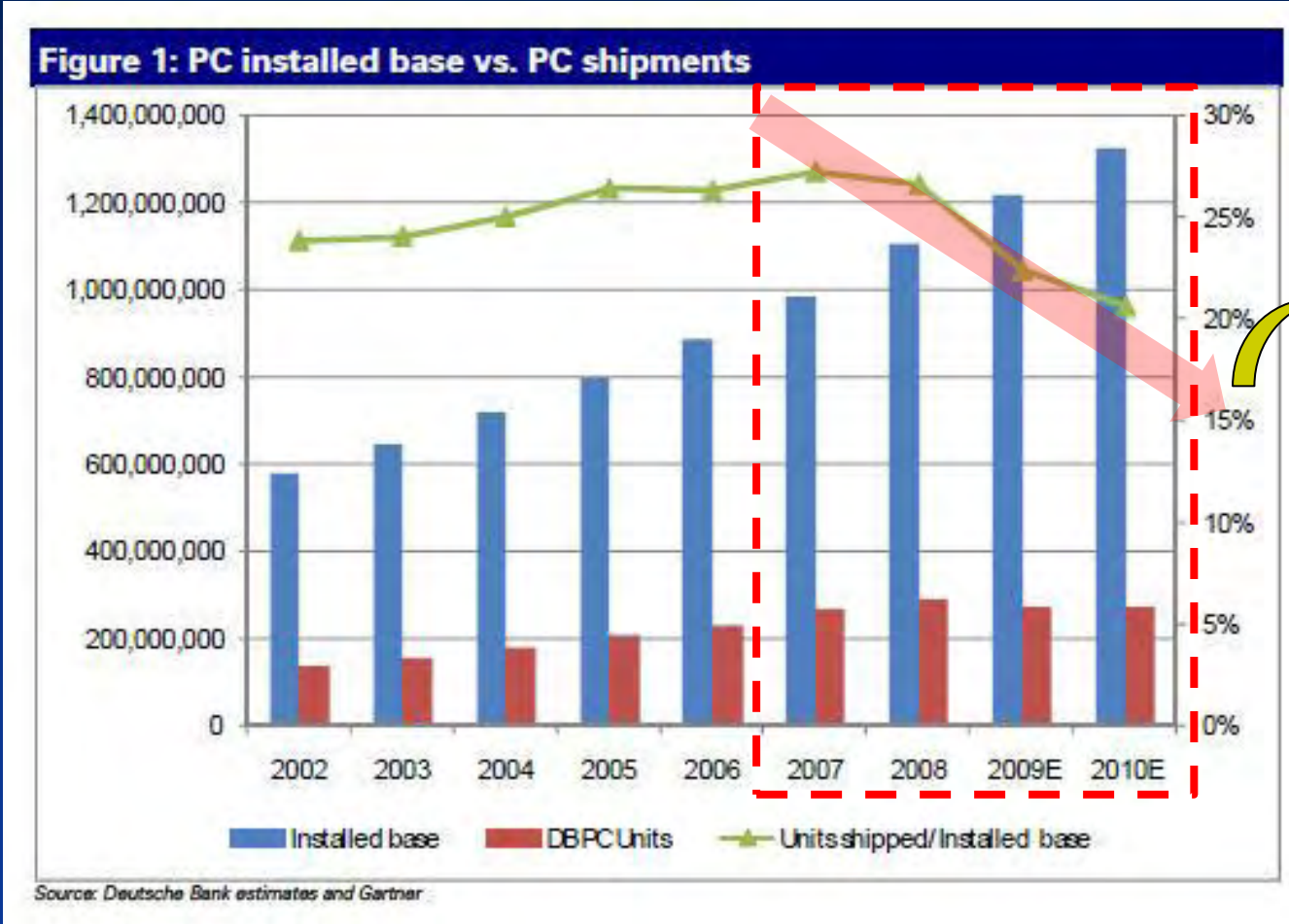
We view Storage as capacity not as performance increase component in computer systems such as CPUs, Memories, and Video Cards.

For decades, people focused storage as capacity oriented and not performance oriented. We focus to educate end users that storage is also fundamental part of performance metrics in computer systems.

One of the most frequent and growing question from end user of SSD, especially high end SSD user, is about performance with dirty NAND flash.

PC replacement Cycle

Over the years, the PC replacement Cycle has been declining with respect to the installed base



OS/HW related!

OS / HW Requirements

OS	Release Date	Min. Processor	Min. Memory	Max. Supported Memory	Min. HDD
Windows XP SP1	2002	233MHz	64MB	4GB	1.5GB or Higher
Windows XP SP2	2004				Additional 1.8GB
Windows Vista	2007	800MHz	512MB	4GB	20GB
Windows XP SP3	2008				Additional 900MB
Windows 7	2009	1GHz	1GB	4GB	16GB

All based on 32bit OS

Longer PC-Replacement Cycle Wins Montana Contest to Cut Budget

Posted by [Kara Reeder](#) May 21, 2010 10:48:50 AM

Montana Gov. Brian Schweitzer has announced the winning idea from citizens to cut the budget: **a five-year computer replacement cycle, instead of replacing them every four years.** An Associated Press article in The Washington Post reports that the idea will save Montana about \$400,000 a year.

In addition, the other final four ideas will also be implemented, says Schweitzer. Coming in at second place was a plan to cut the number of state cell phones and other wireless devices, followed by reducing the size of the state motor pool and a suggestion to conserve energy at the state data center by using servers more efficiently.

10 years

Year 2000

- Pentium IV chips running at 1.8GHz => In CPU Passmark; a score of 220
- In 2000 IBM Deskstar showed 45MB/s and access time of 12ms in HDTach

Today (2010)

- Core i7 980X with CPU Passmark of 10,167 => **46X faster than 2000**
- Today (2010) 500GB Seagate 7200 has 106MB/s => **2.3X faster than 2000.**

Storage as Capacity NOT Performance



Do you need New PC?

- The replacement cycle is getting longer compared to earlier days.
- PC performs slowly not most due to CPU, memory and GPU, but due to old mechanical **CAPACITY** oriented Hard disk drives.

This degradation is due to:

- Capacity oriented HDDs
- Spyware, malwares, virus scanner, file fragmentation, internet caching services...
- Hence no matter how new your system is, the performance degrades over some month of use

Do you really need a new PC? NO! You need Performance oriented SSDs



Performance Upgrade?

For faster computers as an upgrade component in Windows OS based systems users think:

- 1.- Memory Upgrade: Software makers addresses users about performance boost when upgrading memories (i.e. 1GB RAM vs 2 GB RAM)
- 2.- GPU Upgrade: This is graphics card GPU upgrade. Second to Memory upgrade. In retail shops we can see abundant GPU cards where users can upgrade easily to boost games and graphic intensive applications.
- 3.- CPU Upgrade: This is a hard task but users with computer skill will upgrade CPUs or “overclock” CPUs

Is this it?



Performance Upgrade?

How about Storage?

-The common thought among users is that storage is related to capacity increase and not performance increase.

But...

This thought can be changed with Solid State Drives.

SSDs are the easiest way to upgrade and lowest cost (maximum ROI) to upgrade old PC for faster performance.

Performance Upgrade?

- 1.- Memory Upgrade:
- 2.- GPU Upgrade:
- 3.- CPU Upgrade:



- 1.- Storage Upgrade (SSD)
- 2.- Memory Upgrade
- 3.- GPU Upgrade
- 4.- CPU Upgrade

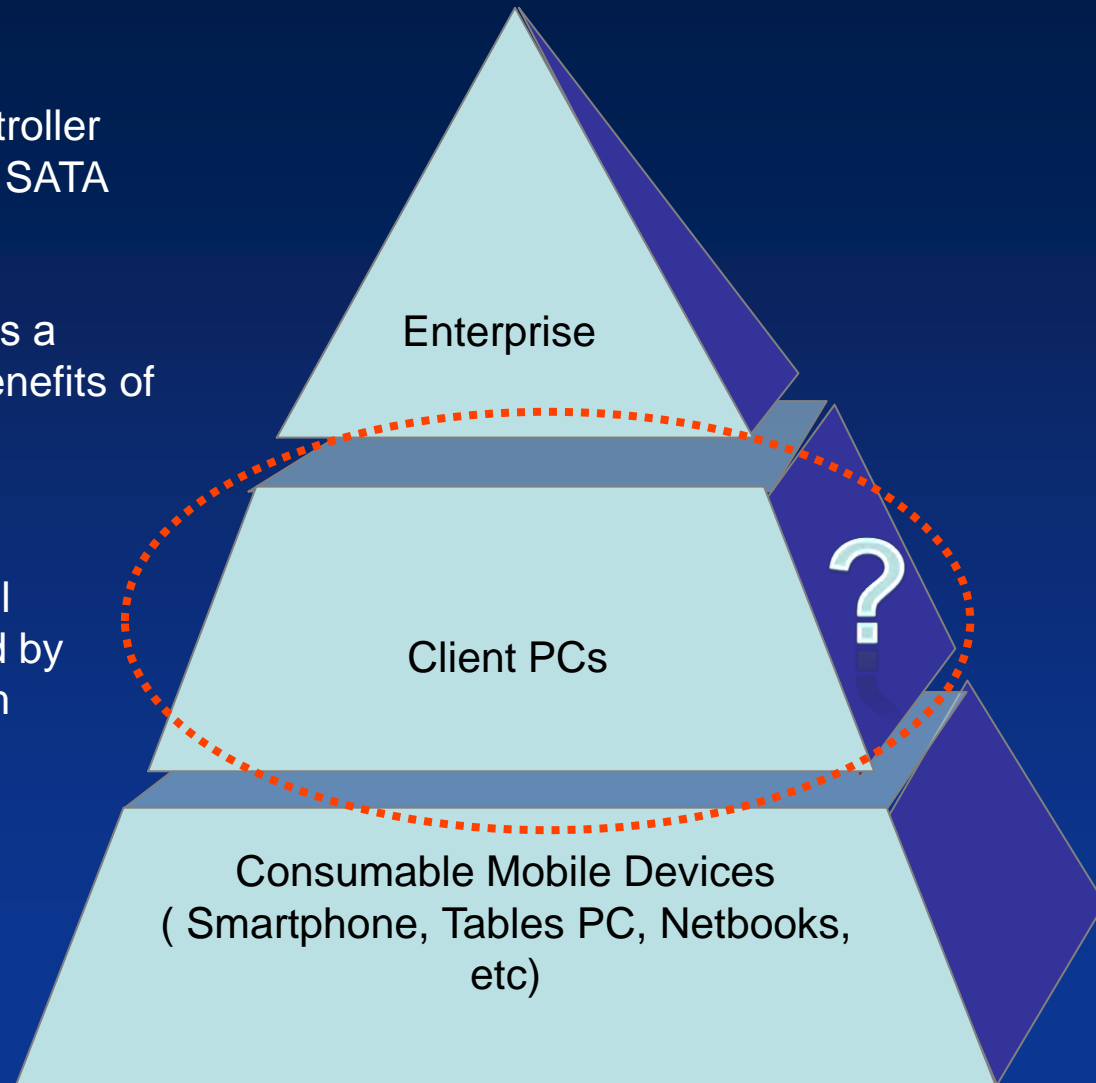
Product Positioning

Thunderbolt™: Fastest SATA 6Gbps controller solution and will prove the need for higher SATA interface.

Tube™: Developed for MOSAID, Tube™ is a prototype controller that showcases the benefits of HLNAND™ to develop GB/s-Class SSDs.

Barefoot™ and its Sequel: The revised version of SATA 3Gbps Barefoot™ that will consume the maximum bandwidth allowed by SATA 3Gbps in both Sequential & Random operations!

Tinkerbell™: High performance e.MMC 4.4x controller to fully utilize the maximum bandwidth allowed by e.MMC 4.4x specifications, which is 104MB/s.





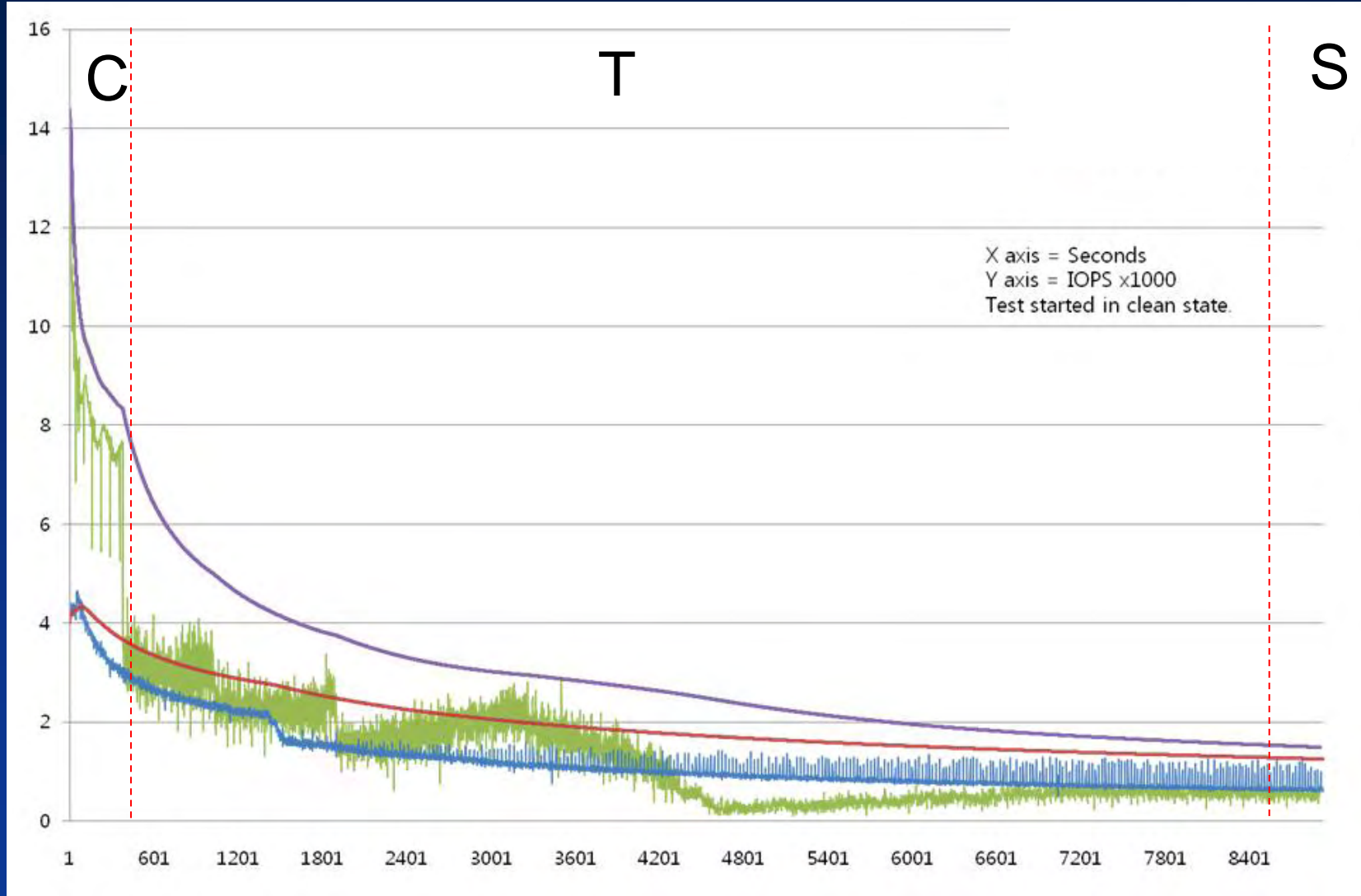
The Falsity about SSDs

SSDs are expensive -> not really! Depending on the usage models, currently you can buy boot drives as low as \$60!

SSDs have very short lifecycle due to NAND physical characteristics -> not True! Advanced FW algorithm such as INDILINX Ndurance™ technology and LongLife™ Technology, you can have SSD as long as your PC is LIVE!

SSDs over time degrades performance -> Maybe true. Hard Disk Drives degrade over time much faster than SSDs due to its mechanical limitations. Outer cylinders are used and over time the fragmented files are distributed over inner cylinder requiring more seek time for the mechanical heads. SSDs may show the performance degradation due to dirty condition of NAND.

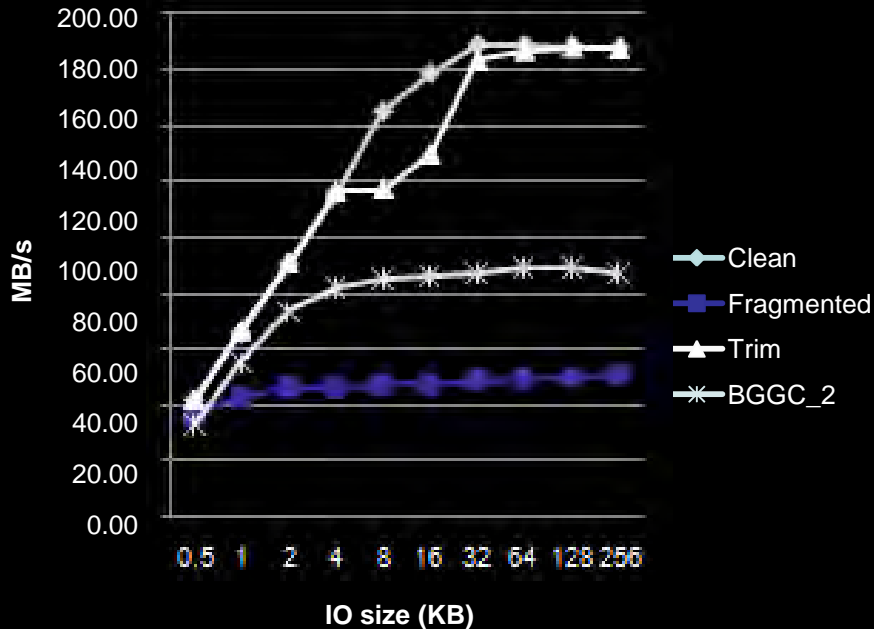
Example: Random Write 4KB



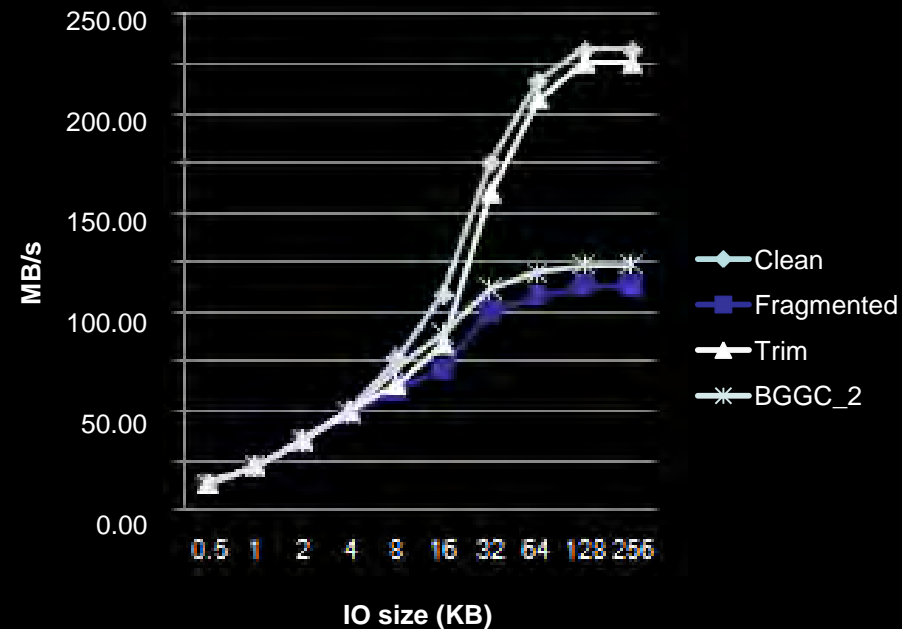
TRIM & BGGC

Based on INDILINX Original Barefoot SSD Controller

Sequential Write



Sequential Read



INDILINX was THE FIRST in the industry to provide BGGC & TRIM Support!

INDILINX P²

- **NEW FW Development by INDILINX with :**

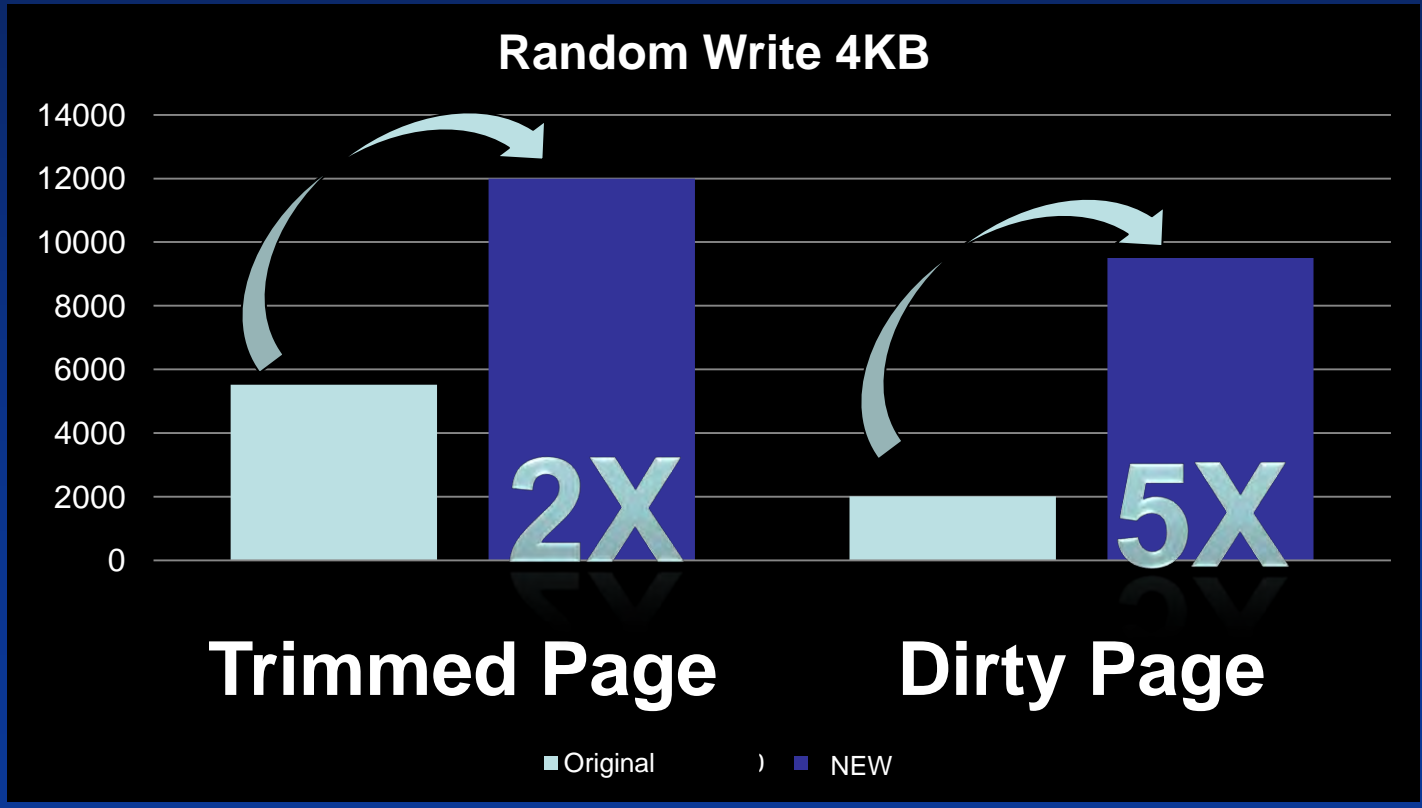
- Targeted at Barefoot™, Barefoot 2™, and beyond
- Performance boost by **HyperQueueing™** technology
- Fault tolerant design

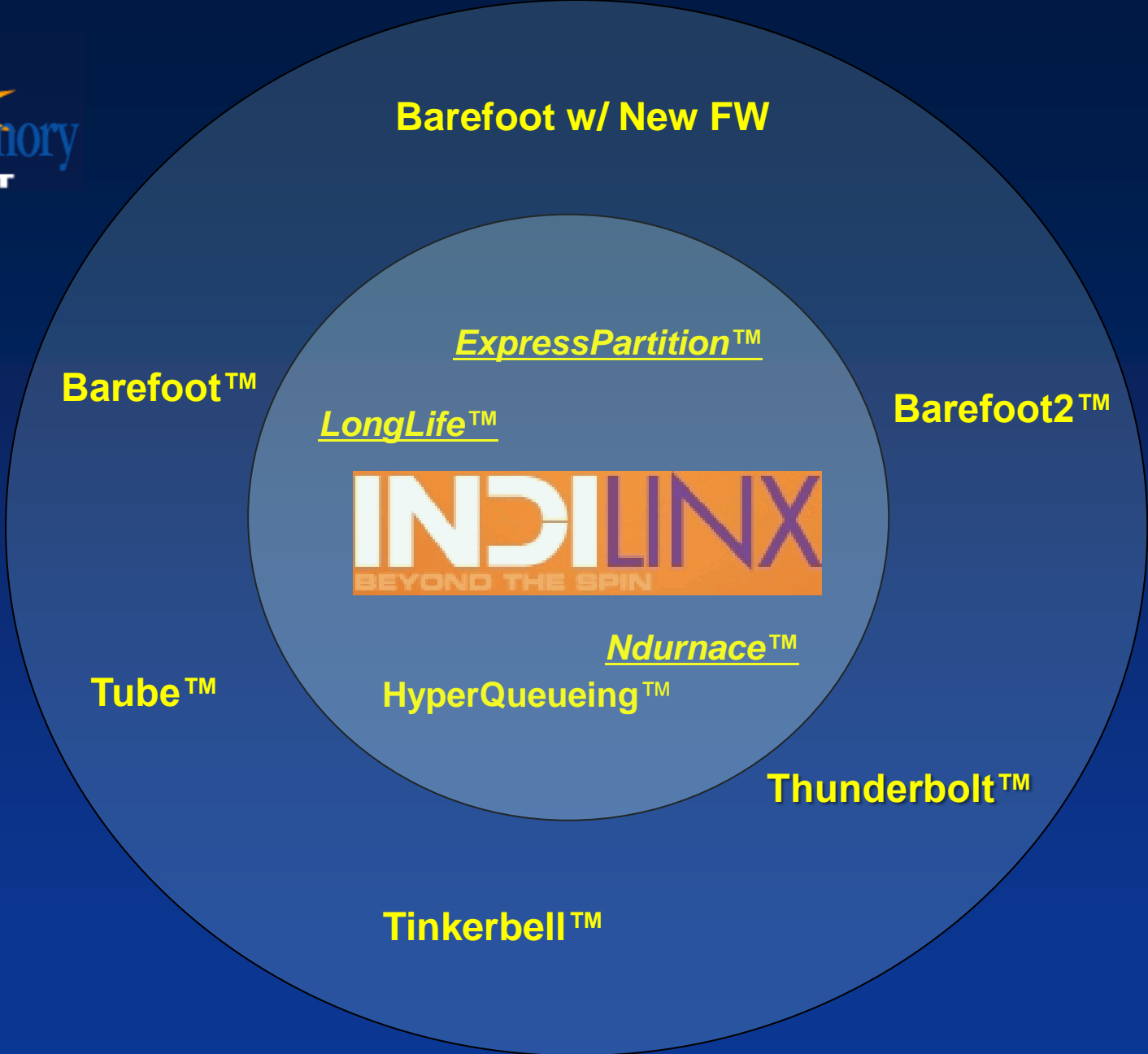
- **Features (Not listed fully)**

- ➔ • **Over provisioning** ratio adjustable by end user with GUI
- **LongLife™ technology**: SSD can be used even beyond the maximum bad block count limit.
- ➔ • **GUI program** for end user to dynamically enable/disable Background Garbage Collection → Useful for mobile PC
- ➔ • **ExpressPartition™** to store the system paging file and other frequently updated files
- And so on...

Barefoot new FW w/ INDILINX P²

- Highlights
 - Added support for SAMSUNG 35nm and Toshiba 32nm async
 - NEW firmware architecture
 - **Sequential Write improvement** from **180MB/s to 225MB/s**





Thank You!