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Solid State Drives (SSD) Markets and Applications Quarterly Series: 1Q 2011

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Executive Summary

This report is a series of four quarterly SSD reports focused on markets and applications for Client, Commercial and Enterprise. This first quarterly report for the year is a comprehensive SSD report covering all topics on SSDs. In addition, this report includes forecasts and detailed information on the HDD industry and its relationship to SSD adoption in the various markets and applications. Each quarterly report following the comprehensive report does a deep dive into each of the segments which also includes quarterly unit shipments and revenue data. Also included is a quarterly SWOT analysis of thirty plus SSD companies. The second quarterly report focuses on SSDs in the enterprise segment; its markets and applications. The third quarterly report focuses on opportunities for SSDs in the client segment. The fourth quarterly report focuses on SSDs in the commercial segment.

SSDs in client, enterprise, and commercial applications continue to mature. Significant improvements have been made by SSD suppliers boosting overall performance and reliability through improved controllers. Newer companies such as SandForce, Virident, Anobit along with existing controller companies have announced new controllers and architectures that are improving the overall performance and reliability of SSDs.

Most SSDs today utilize HDD standard form factors of 1.8/2.5/3.5 inch. Smaller mobile platforms such as Tablets, Smartbooks, Netbooks and Ultra-slim Notebooks require more compact packaging creating a trend to move away from the popular HDD form factors. SSD suppliers are providing small modular form factors that are packaged as a pluggable cards, and board solderable BGA modules.

Enterprise SSDs are making several transformations. Lower costs are helped by employing MLC technology for less write intensive applications. Improved controllers along with selective NAND (eMLC) with higher endurance helps deploy MLC into enterprise applications. The first enterprise SSDs had SATA interfaces and many still do today, however there is a trend to migrate enterprise SSDs to SAS interfaces. This is done either through SATA to SAS adapters or "Native" SAS interfaces. All mission critical enterprise HDDs have SAS interfaces. Displacing enterprise HDDs with SAS SSDs helps to improve interoperability making the HDD to SSD transition easier.

PCIe SSDs are continuing to gain traction in enterprise. Fusion io was the first to introduce the architecture putting storage closer to memory via the PCIe bus, vastly improving performance and reducing bottlenecks in servers. Over the years Fusion io have had a number of design wins with major storage companies such as IBM, HP and a number of others. There have been a number of other SSD suppliers that have launched or have on their roadmaps PCIe SSDs, recognizing the performance advantages the memory oriented architecture has in many enterprise server applications.

SSD industry associations have matured and have established specifications with common criteria SSDs must conform to for testing and interoperability. Establishing these common threads will help the SSD industry as it did the HDD industry in its early days to accelerate SSD adoption.

New storage and memory architectures and technologies are being developed that could eventually change the landscape of storage in ten years time. Storage Class Memories is one that promises to fulfill the storage and performance requirements of the future, however today, SSDs is the beginning of that transformation.

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Adoption of SSDs in client and enterprise applications gained momentum in 2010 with shipments and revenue doubling to 10.3M units and $2.6B. The outlook for 2011 is 16.6M units and $4.1B in revenue demonstrating continued strong growth.

SSDs in notebooks are not expected to significantly impact and displace HDDs in notebook platforms until 2015 with adoption of over 24% penetration compared to 2.4% in 2011. The popular Tablet platform has made a tremendous impact to the client space affecting Netbook and in some cases Notebook platform demand. SSDs in Tablets will share its adoption rates with embedded flash and will use modular SSDs. Depending on the platform requirements, tablet suppliers will have the choice of SSDs or embedded flash.

HDD suppliers have looked for ways to significantly improve the performance of hard disk drives, particularly during the hype of SSDs for notebook PCs. Seagate launched a year ago a new generation 7200 RPM, 750GB Hybrid Drive called Momentus XT. It has 4GB of NAND flash managed by their "adaptive memory" feature. The demonstrated performance results when compared to SSDs appear to be impressive. If other HDD suppliers follow with Hybrid Drives with comparable performance results it could be a game changer for adoption rates of SSDs in the client space, however to date other HDD suppliers have not gone down this path.

There are over one hundred fifty SSD suppliers in the market. HDD suppliers are now offering SSD products through acquisitions or partnered relationships. Seagate is shipping its enterprise "Pulsar" SSD and has recently purchased Samsung's HDD division, extending its NAND supply partnership between the two companies for SSD products. Hitachi GST through a joint development agreement with Intel is shipping its enterprise class SSD called Ultrastar. Western Digital purchased SSD supplier Silicon Systems in 1Q09 launching its entry into the SSD market and more recently (1Q11) is now in the process of acquiring Hitachi GST. How this affects the Intel relationship is unknown at this time but it will give WDC an advantage in the enterprise space for both HDDs and SSDs.

Toshiba which has its own SSD division completed the purchase of Fujitsu's HDD division in 2009 positioning itself to offer enterprise SSDs to Fujitsu's existing enterprise customers.

These HDD companies have adjusted their business models to become full service storage providers encompassing both HDD and SSD storage technologies. These changes are early indicators of the long term impact SSDs will have on the storage landscape. HDD companies are now consolidating down to three suppliers, each with SSD products complimenting their HDD offerings.

Memory module manufacturers, as well as SSD manufacturers for the industrial markets, have expanded their SSD offerings into the PC and consumer space further adding to the number of suppliers. Over the long term there will be a tremendous reduction in the number of SSD suppliers similar to what the hard disk drive market experienced over the past fifty one years, due to the competitiveness of the market.

SSDs configured in PCs promise better performance, improved reliability and lower power consumption. HDD based PC platforms are also offering alternatives for improved performance and at the same time providing much higher capacities than SSDs due to cost. Hybrid hard drives (HHD), which incorporates NAND flash as a cache memory has been resurrected as the first generation HHD product did not meet expectations for improving system performance and lowering power consumption. Seagate renewed this effort with a new version that demonstrates promise.

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Additional performance accelerator for PCs are Flash Cache modules and low capacity SSDs. They are expected to penetrate the majority of desktop and notebook PCs by 2014 for performance acceleration and will affect Hybrid Drive adoption from HDD suppliers as an alternative performance accelerator.

The executive summary in this report provides a list of the quantitative findings about the SSD market and product developments throughout the forecast period. Total pages 244.

Analysis and Reporting Methodology

This report analyzes the potential of the SSD Market, in conjunction with the Hard Disk Drive Market. The report also assesses future developments of the storage industry and quantifies the different aspects of market growth from 2010 through 2016. It takes into consideration the economic outlook, and technology changes underway; and the impact these changes will have on the storage industry in general, and on solid state technologies in particular.

Because of the growing complexity and scope of the data storage industry and markets, there is a need to put the qualitative and quantitative aspects of the development trends into a broader perspective. Therefore, this report considers the technological, commercial, and application development aspects of the storage industry. In particular, it explores, in general terms, the evolution of storage needs and requirements in the computing, communications and consumer industries.

Relevant primary data and information were collected from discussions with industry and company representatives. Secondary data and information have been obtained from public sources, such as company documents, press releases, annual reports and industry statistics, as well as from the existing Web-Feet Research database. Historic data have been crosschecked and correlated with industry statistics. Forecast data and their interpretation are based on analyses and assessments of Web-Feet Research.

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About Web-Feet Research

Web-Feet Research (WFR) offers a full complement of technology consulting services, management consulting services and market research for nonvolatile memory, solid state storage technologies and mobile hard disk drive products. Special emphasis has been focused on the development and growth of Flash memory, Flash cards, Embedded Flash Drives (EFD) and SSD markets.

The company has consistently identified the emerging trends in the electronics industry and has been the first to forecast their impact in the Flash and nonvolatile memory markets since its inception in 2000. Some of WFR's firsts are in the following areas: SSD, Flash cache/Hybrid Flash, Embedded Flash Drives, Ultra Low Cost PC, Mobile storage, MP3, NAND MCP, USB Drives, Flash SIM cards, micro Flash cards, 3-bit/4-bit per cell NAND, serial NOR Flash and Storage Class Memories.

The subscription services offered by Web-Feet Research concentrate on the Non-Volatile Memory and Storage Portfolio, which is segmented into three services: Manufacturing / Technology, Storage Systems, and Memory Components.

The company also organizes annual public and on-site presentations, the NVM conferences, which supplement the consulting and research services. These conferences focus on technology evolution, product development, storage markets and industry / economic trends.

Web-Feet Research also provides custom studies, technology evaluation and competitive analyses of mobile, portable and stationary technologies, products and industry trends. The professional services and syndicated studies give Web-Feet Research, its clients and its clients' clients a competitive edge in their respective markets.