

HDD Market Down to Three Suppliers

Seagate and Samsung announced a broad agreement this morning (April 19, 2011) that the two companies will "combine" their HDD businesses. Seagate will pay Samsung \$1.38 billion, half cash and half newly-issued shares of Seagate stock, which will result in Samsung owning 9.6% of Seagate, earning Samsung a nomination for a position on Seagate's board.

In addition, the companies entered into sourcing agreements, with Samsung supplying NAND to Seagate for SSDs and Hybrid HDDs, and Seagate supplying HDDs to Samsung for PCs, notebooks, and consumer electronics. The companies will jointly develop "enterprise storage solutions." The deal also involves patent cross licensing.

The companies state that this agreement broadens a strategic relationship between Seagate and Samsung that began with a joint development agreement announced in August 2010. Seagate expressed an opinion that this event does not create any material restructuring costs.

What this means to the HDD Market

The acquisition of Samsung's HDD business by Seagate comes close on the heels of the pending merger of Hitachi's HDD business with Western Digital. Based upon calendar Q4 2010 shipments combining Seagate and Samsung HDD business give Seagate about 40% of the HDD market and combining Hitachi GST and Western Digital HDD business would result in Western Digital having about 48% of the HDD market. Total shipment share for the two companies should be close to 90% with the remaining balance owned by Toshiba, who finished their acquisition of Fujitsu's HDD business in late 2009.

The price Seagate paid for Samsung's HDD business far exceeds the value of the company's HDD business alone. Samsung makes 2.5-inch HDDs for mobile applications and 3.5-inch HDDs for desktop applications and uses many of the drives it makes. Samsung also has an external storage business which presumably will be part of the deal. Seagate currently ships products to all three of these markets and so does not realize a significant gain in any market segment from the deal. The bulk of the payment is probably closely associated with the flash memory supply agreement between Samsung and Seagate. Seagate thus joins Apple in strategic flash memory supply contracts (in Seagate's case to support the company's developing enterprise SSDs as well as its hybrid HDDs which are due for a refresh soon).

The release also states: "In connection with its strategic alliance with Samsung, Seagate expects also to strengthen its relationship with TDK Corporation/SAE Magnetics (H.K.) Ltd." TDK/SAE is the only remaining independent HDD head supplier and Samsung was their customer. We believe that the statement implies that Seagate will continue to buy heads from TDK after the Samsung HDD business acquisition. This

move will help to stabilize the remaining independent head supplier, who provides high capacity heads to Seagate and Western Digital as well as Samsung and Toshiba.

What this means to SSDs

This announcement shows that Seagate is finally taking the SSD market seriously. So far its efforts in SSDs have amounted to little more than a gesture.

For the past four years or more SSDs have been chipping away at the fringes of Seagate's enterprise HDD market, a market that Seagate dominates with a 61% unit shipment market share. Some analysts believe that enterprise HDDs are Seagate's only profitable business. We have wondered when Seagate would understand that SSDs pose a threat to enterprise HDDs and finally take action to participate in this important business. Unlike photo film companies (Kodak, FujiFilm, Agfa, Polaroid...), we didn't expect Seagate to simply ignore the problem and hope that it would go away.

With a solid supply agreement with Samsung, Seagate can assure that the company will be in a leading position any time that NAND flash enters a shortage. Without such an agreement, Seagate's currently small SSD market share and its resultant tiny level of NAND purchases would be likely to drive NAND suppliers away as they struggled to supply the needs of more significant NAND consumers. Thus Seagate may be assuming the sort of supply agreement on flash memory for enterprise and computer applications that Apple has had for consumer applications.

We have to suspect that the "enterprise storage solutions" development efforts that these companies have agreed to undertake will involve the development of enterprise SSDs and other potential alternatives to the enterprise HDD, including PCIe solid state storage devices and other new developments utilizing faster performing interfaces and networks..

Will Toshiba Survive?

Toshiba is left with about 10% of the HDD market after the Seagate/Samsung and Western Digital/Hitachi GST mergers. Thus the company is a much smaller player in the market than the two remaining larger suppliers. Toshiba's situation is only sustainable if the company can nimbly establish viable niche markets where the other players are not participating or if it can gain some market share from Hitachi GST or Samsung that would otherwise go to Seagate or Western Digital. Past mergers indicate that this could happen but seldom has the industry hosted two mergers of this size simultaneously.

Seagate and Western Digital supply 2.5-inch mobile and enterprise HDDs and in the long run Toshiba will face increasing pressure in these markets. There is some possibility of a 5-10% share gain by Toshiba in the notebook computer market and possibly a similar share in the enterprise market resulting from the merger. Combined

this could increase Toshiba's overall market share to perhaps 15% by units at least in the short term.

One area where Toshiba does maintain a unique position is that it is the only supplier of 1.8-inch HDDs. These HDDs could be a great fit for a "fat tablet" for business applications that could include an HDD (perhaps in addition to flash memory-see HDDs and Flash Memory: A Marriage of Convenience by Coughlin Associates and Objective Analysis, 2011, www.tomcoughlin.com/techpapers.htm).

These small HDDs have been used in Apple iPod Classic AV players and in ultra-mobile notebook computers but shipment numbers have been steadily declining in the last few years as mobile products have increasingly migrated to flash memory. In light of the spate of HDD mergers Toshiba might want to reconsider what it could do with this unique storage device, currently offering storage capacities as high as 320 GB.

How will OEMs Fare?

Typically prices are higher when there are fewer competitors. With the HDD makers consolidating recently from six to three makers it would be natural to expect to see less price volatility than the market has suffered in the past.

How is market concentration measured? The US Department of Justice uses the HHI or "Herfindahl-Hirschman Index", which is simply the sum of the squares of the suppliers' shares. A highly concentrated (and less competitive) market has an HHI of 1,800 or more. Moderate concentration is 1,000-1,800, and low concentration is below 1,000. With this acquisition both Seagate and Western Digital (with that company's Hitachi Data Systems acquisition) will be roughly $48^2 + 40^2 + 12^2 = 4,004$, a fact likely to create significant inquiries on the government's side before this transaction goes through.

Why is the Market Consolidating so much?

In 2009 Objective Analysis compiled a brief: Why the DRAM Market Must Consolidate. In a nutshell this brief points out that the costs of DRAM fabrication plants are rising faster than the market is growing. The only way for a DRAM maker to afford to construct tomorrow's plant is by increasing its share, which is most easily done by acquiring a competitor. This could be a factor in recent consolidations, but more issues appear to be involved.

The consolidation of the HDD industry is following a trend often repeated in mature technologies. As the differentiation between products in an industry is based less on technology and niche markets and more on the total cost of manufacturing the number of sustainable suppliers tends to decline. However HDDs are increasing in technology (areal density) as well as unit volume and thus the reason for consolidation is a bit different than for normal mature industries where technology is usually fairly static (such as household appliances).

On average the HDD unit growth is 15% annually and the areal density increase for HDDs will probably be in the range of 30-40% annually over the next few years. The HDD industry is different than many industries in that the costs of new HDD technology and the components needed to build the HDDs exceed the amortized cost of the factories, but the scale of product introductions of these technologies favors faster cost reductions for larger manufacturers compared with smaller manufacturers. This results in a reduction in manufacturers over time but for somewhat different reasons than the classic model for mature industries.

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