

# DISCON 2010

## “HDD Areal Density & The Low Price Limbo”

September, 2010

Q: How fast is the HDD Industry increasing its Areal Density?

A: Areal density has been slowing down since 2007. The yearly increase in 2.5"-2Disk-Notebook PC class drives has been 56%, 28%, 17% per year for 2007 – 2010, respectively.

# HDD Areal Density

HDD Industry - Highest Capacity 2.5", 2-Disk Internal Notebook HDD - U.S. Retail Channel

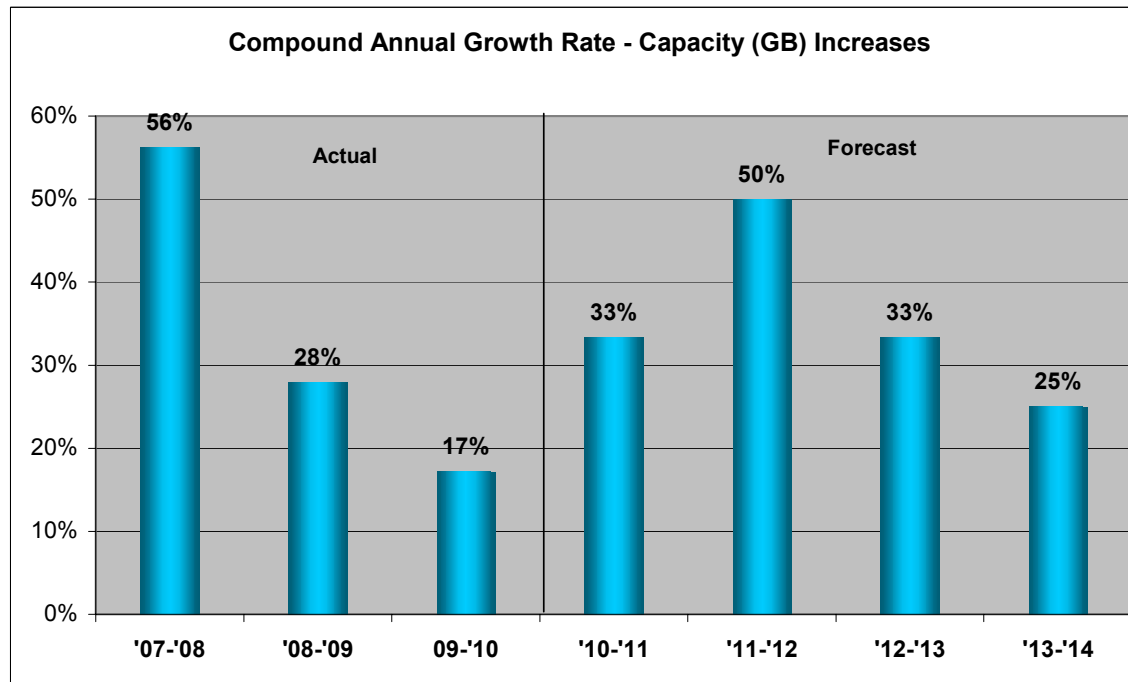
Actual / Forecast

	2007				2008				2009				2010				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Capacity (GB)	200	250	250	320	320	320	500	500	500	500	640	640	640	640	750	750	750
Lowest Price\$	\$299	\$239	\$215	\$269	\$259	\$329	\$229	\$159	\$119	\$82	\$139	\$120	\$113	\$110	\$100	\$95	\$95
\$/GB	\$1.50	\$0.96	\$0.86	\$0.84	\$0.81	\$1.03	\$0.46	\$0.32	\$0.24	\$0.16	\$0.22	\$0.19	\$0.18	\$0.15	\$0.13	\$0.13	\$0.13

Forecast

	2011				2012				2013				2014				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Capacity (GB)	750	1000	1000	1000	1000	1500	1500	1500	2000	2000	2000	2000	2000	2500	2500	2500	2500
Lowest Price\$	\$75	\$115	\$100	\$95	\$75	\$115	\$100	\$95	\$125	\$110	\$100	\$95	\$80	\$125	\$110	\$100	\$100
\$/GB	\$0.10	\$0.12	\$0.10	\$0.10	\$0.08	\$0.08	\$0.07	\$0.06	\$0.06	\$0.06	\$0.05	\$0.05	\$0.04	\$0.05	\$0.04	\$0.04	\$0.04

Period	C.A.G.R.
'07-'08	56%
'08-'09	28%
09-'10	17%
'10-'11	33%
'11-'12	50%
'12-'13	33%
'13-'14	25%
<b>2007 - 2014</b>	<b>34%</b>



Q: Is there a consistent leader introducing new high capacities?

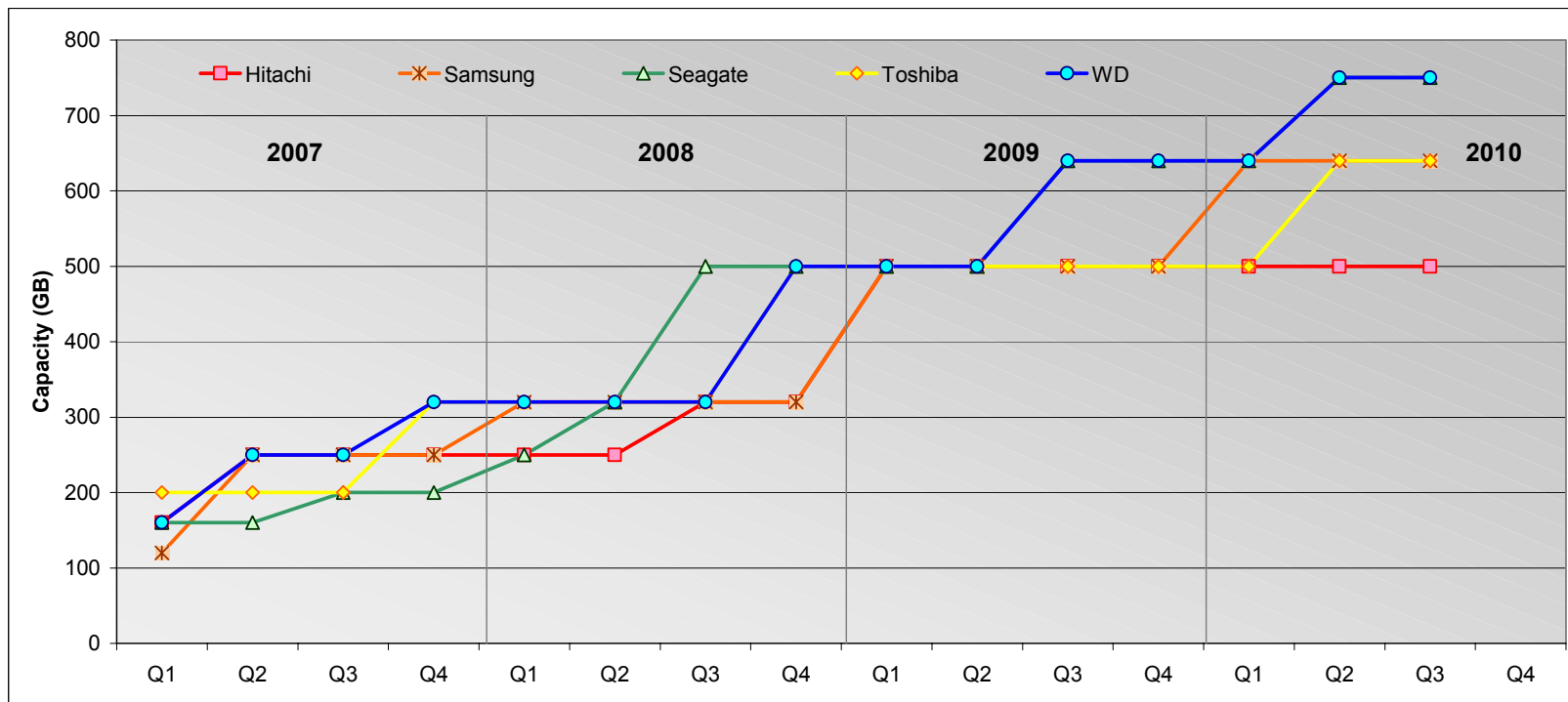
A: The chart at the right shows that areal density leadership changed hands several times over 2007-2010. Do HDD mfg. have equal availability to the same best-performing, new heads?

# Is There an Areal Density Leader?

## HDD Industry - Highest Capacity 2.5", 2-Disk Internal Notebook HDD - U.S. Retail Channel

Actual / Forecast

	2007				2008				2009				2010			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Fujitsu	200	200	200	250	250	320	500	500	500	500	500	500	500	500	500	500
Hitachi	160	250	250	250	250	250	320	320	500	500	500	500	500	500	500	500
Samsung	120	250	250	250	320	320	320	320	500	500	500	500	640	640	640	
Seagate	160	160	200	200	250	320	500	500	500	500	640	640	640	750	750	
Toshiba	200	200	200	320	320	320	320	500	500	500	500	500	500	640	640	
WD	160	250	250	320	320	320	320	500	500	500	640	640	640	750	750	



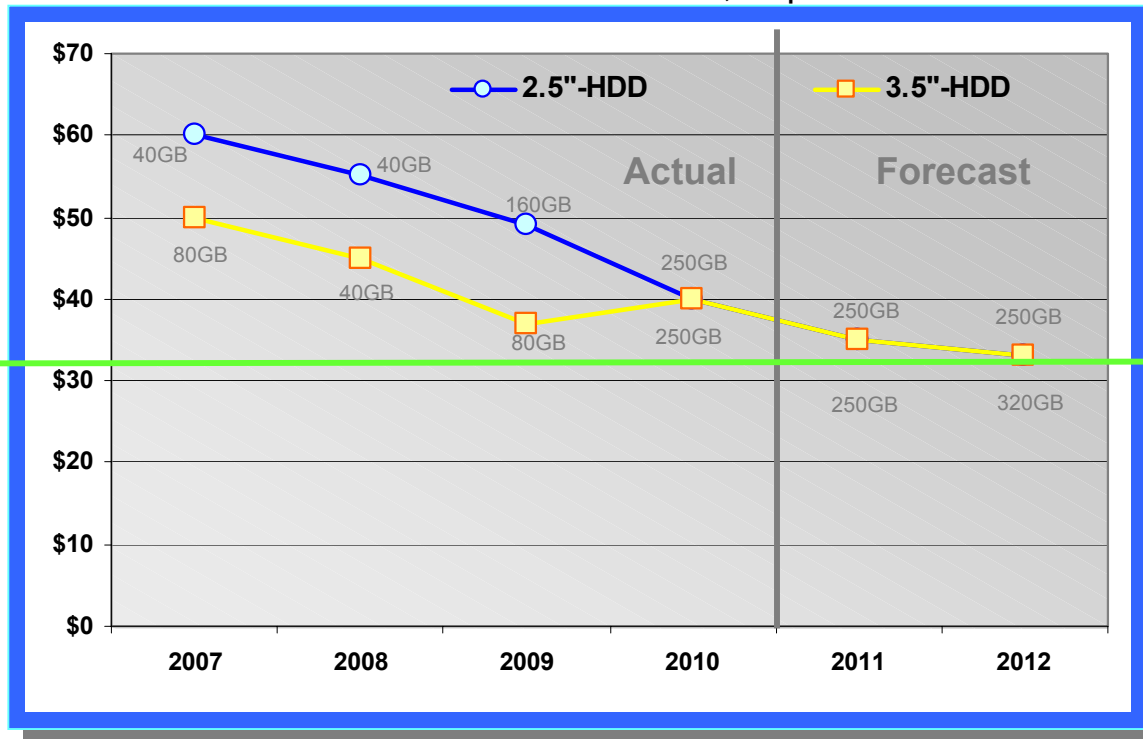
Q: Are hard drives really getting cheaper, or is it only the \$/GB that is getting cheaper?

A: Hard drives have become cheaper over the last several years. The slide on the right shows that the retail price for the lowest available 2.5" HDD has dropped from \$59.99 down to \$39.99. How low can a HDD price go for a brand new drive, not on a "fire sale"?

# HDD \$/Drive Limbo

- Is there a \$/Drive Asymptote
  - How Low Can HDD Go? Improved since 2007 but has a limit

Lowest Retail Price Found Per Drive, Top U.S. Retailers



*Will this be the HDD Asymptote?*

Q: What is all of this I'm hearing about SSD's coming into HDD markets? What are SSD's priced today vs. a HDD?

A: See the chart on the right. The lowest retail price for a 256GB SSD is currently at a 13X premium over a 250GB HDD.

# HDD vs. SSD: How Do They Compare Now?

- 256GB SSD is 13X More Expensive Than 250GB HDD
  - HDD 250GB=\$39.99, SSD 256GB=\$520
  - Prices are from Q3CY10. Week 35 = Sunday, 8/29/2010

Lowest Prices Tracked														2.5" HDD Internal Portable
GB	WK27	WK28	WK29	WK30	WK31	WK32	WK33	WK34	WK35	WK36	WK37	WK38	WK39	QTD%Δ
160	\$39.99	\$39.99	\$39.99	\$39.99	\$39.99	\$39.99	\$38.37	\$39.99	\$36.99					-8%
250	\$39.99	\$39.99	\$39.99	\$39.99	\$39.99	\$34.99	\$39.99	\$34.99	\$39.99					
320	\$46.99	\$44.99	\$44.99	\$48.29	\$44.00	\$42.99	\$42.99	\$42.99	\$44.99					-4%
400	\$64.99	\$64.99	\$64.99	\$64.99	\$64.99	\$64.99	\$64.99	\$64.99	\$64.99					
500	\$54.99	\$54.99	\$59.99	\$54.99	\$54.99	\$54.99	\$55.11	\$49.99	\$49.99					-9%
640	\$79.99	\$79.99	\$74.99	\$79.99	\$79.99	\$79.99	\$79.99	\$79.99	\$79.99					
750	\$110	\$109	\$109	\$99.99	\$99.99	\$94.99	\$99.99	\$99.99	\$94.99					14%
1000	\$170	\$170	\$170	\$170	\$170	\$115	\$130	\$130	\$130					-24%

Lowest Prices Tracked														SSD
GB	WK27	WK28	WK29	WK30	WK31	WK32	WK33	WK34	WK35	WK36	WK37	WK38	WK39	QTD%Δ
8	\$45.99	\$45.99	\$45.99	\$45.50	\$45.50	\$45.50	\$45.50	\$45.50	\$45.50					-1%
16	\$74.99	\$74.99	\$64.99	\$63.70	\$63.70	\$63.70	\$63.70	\$63.70	\$63.70					-13%
32	\$79.99	\$79.99	\$79.99	\$69.99	\$64.99	\$72.99	\$69.96	\$64.99	\$66.00					-17%
64	\$79.99	\$110	\$109	\$110	\$99.00	\$99.99	\$93.99	\$93.99	\$99.99					25%
80	\$220	\$220	\$170	\$170	\$199	\$199	\$199	\$199	\$200					-9%
120	\$320	\$310	\$230	\$230	\$228	\$210	\$210	\$190	\$190					-41%
128	\$200	\$248	\$200	\$232	\$215	\$189	\$200	\$200	\$215					8%
256	\$505	\$530	\$500	\$500	\$485	\$485	\$519	\$519	\$520					3%
512	\$1,580	\$1,580	\$1,439	\$1,370	\$1,345	\$1,394	\$1,394	\$1,394	\$1,394					-12%
1000	\$34,333	\$34,333	\$3,069	\$3,069	\$3,069	\$3,069	\$3,099	\$3,099	\$3,082					-91%
2000				\$9,686	\$9,686	\$9,686	\$9,686	\$9,686	\$9,686					

**Gap = 13X**

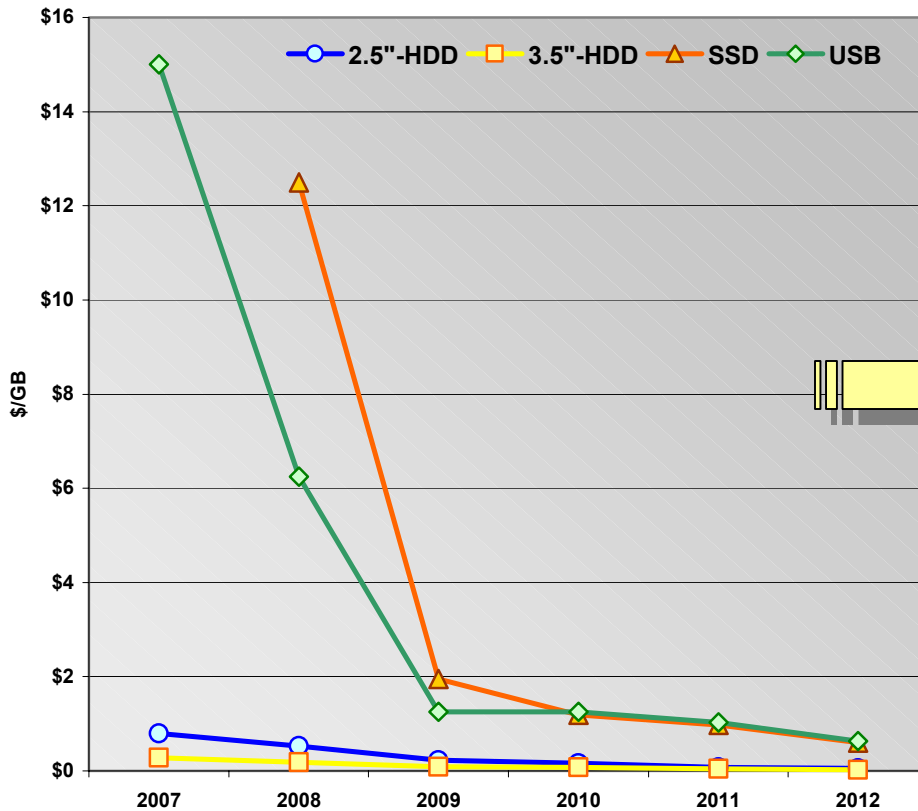
Q: Are SSD's going to "take over the HDD world" any time soon?

A: It's going to be a while. While SSD's have sustained 50% year-on-year price reductions in the past, flash foundry owners are giving guidance (August 2010) of 18% reduction in 2011 and 38% reduction in 2012. If this is the case, then in 2012, with \$49 a consumer may buy a 1TB-2.5" drive or an 80GB-SSD. Still a big gap.

# Forecast

Lowest \$/GB (Brand New in Retail) Actual / Forecast

	2007	2008	2009	2010	2011	2012
2.5"-HDD	\$0.79	\$0.53	\$0.22	\$0.16	\$0.08	\$0.05
3.5"-HDD	\$0.28	\$0.18	\$0.09	\$0.07	\$0.04	\$0.02
SSD		\$12.50	\$1.95	\$1.19	\$0.98	\$0.60
USB	\$15.00	\$6.25	\$1.25	\$1.25	\$1.03	\$0.64



If this forecast comes true,  
how much will a HDD or SSD Cost?

	SSD		HDD	
	2011	2012	2011	2012
32	\$29.99	\$19.99		
64	\$62.45	\$39.99		
80	\$79.99	\$49.99		
128	\$124.99	\$79.99		
250			\$34.99	\$34.99
256	\$249.99	\$149.99		
500			\$39.99	\$34.99
512	\$499.99	\$309.99		
1000	\$975.80	\$599.99	\$79.99	\$49.99

Q: How can I get a copy of this presentation?

A: Email us at: [info@priceg2.com](mailto:info@priceg2.com)  
with the subject of:  
“DISCON Presentation”.

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