

 DRAMeXchange

DRAM Market Update – 2012 & Beyond

– The End of the Perfect Competitive Market –

完全競爭市場的終結

DRAM Team

Memory & Storage Division

Jun. 7th, 2012

TAIPEI

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Demand

- **Marco Economy**
- **2012 DRAM Industry Outlook**
- **Demand – PC (NB, Ultrabook, DT) & Mobile (Tablet and Smartphone)**
- **5 Years Demand Landscape**

Supply

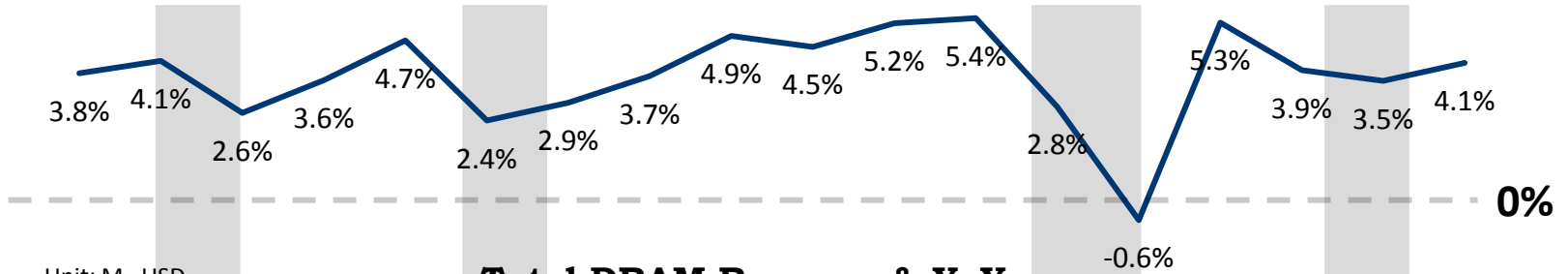
- **Changing Mix of Supply**
- **Supply by Application**
- **Companies' Profitability and Market Share**
- **New Market Cycle**

Conclusion

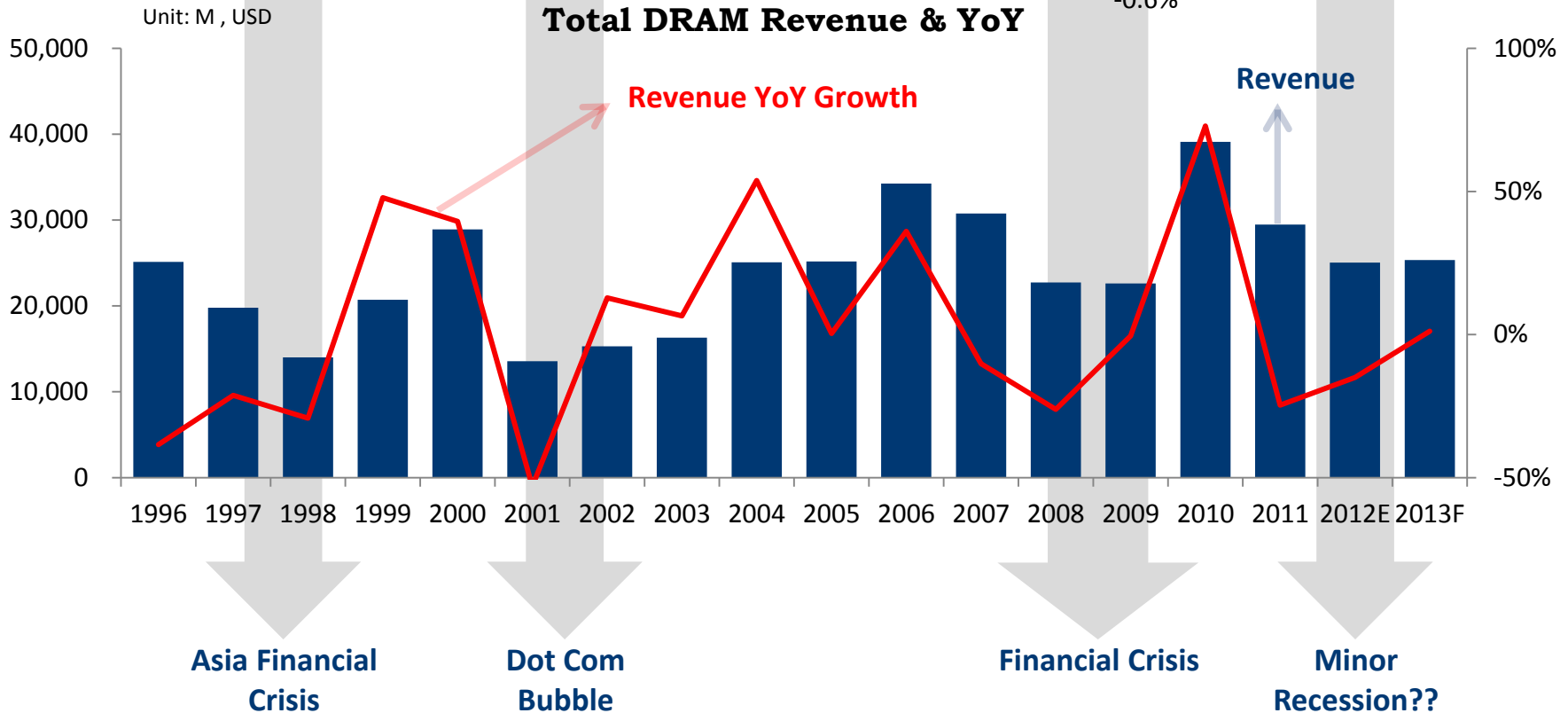
2012: 2nd Dip Unlikely but Slow Recovery

WW GDP Shows High Correlation with DRAM Industry

WW GDP Growth YoY



Total DRAM Revenue & YoY

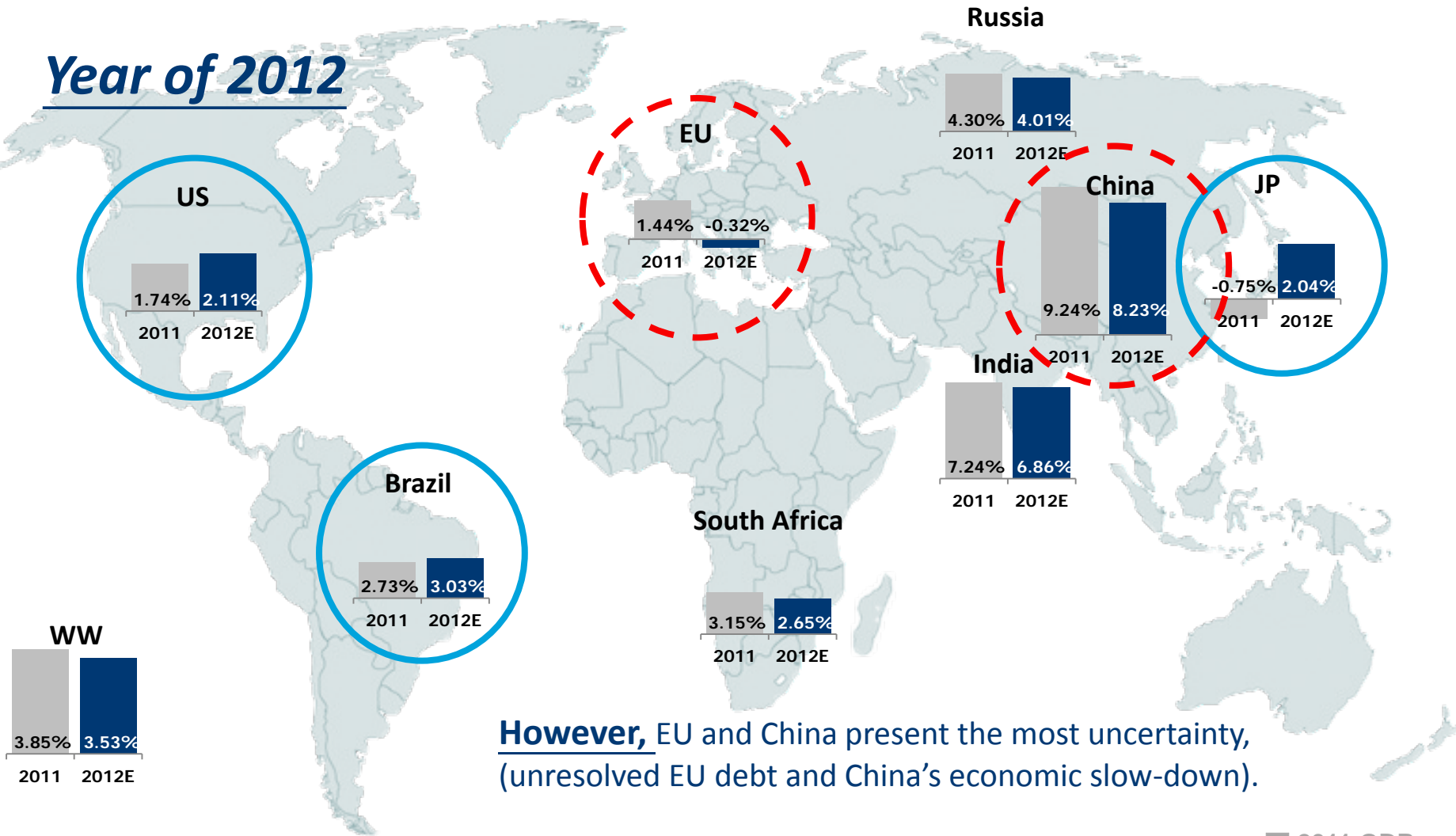


Source: DRAMeXchange, IMF, Jun. 2012

2012 – Market Gradually Improves in 2H

Solid GDP Growth in US, JP and Other Emerging Countries

Year of 2012



However, EU and China present the most uncertainty, (unresolved EU debt and China's economic slow-down).

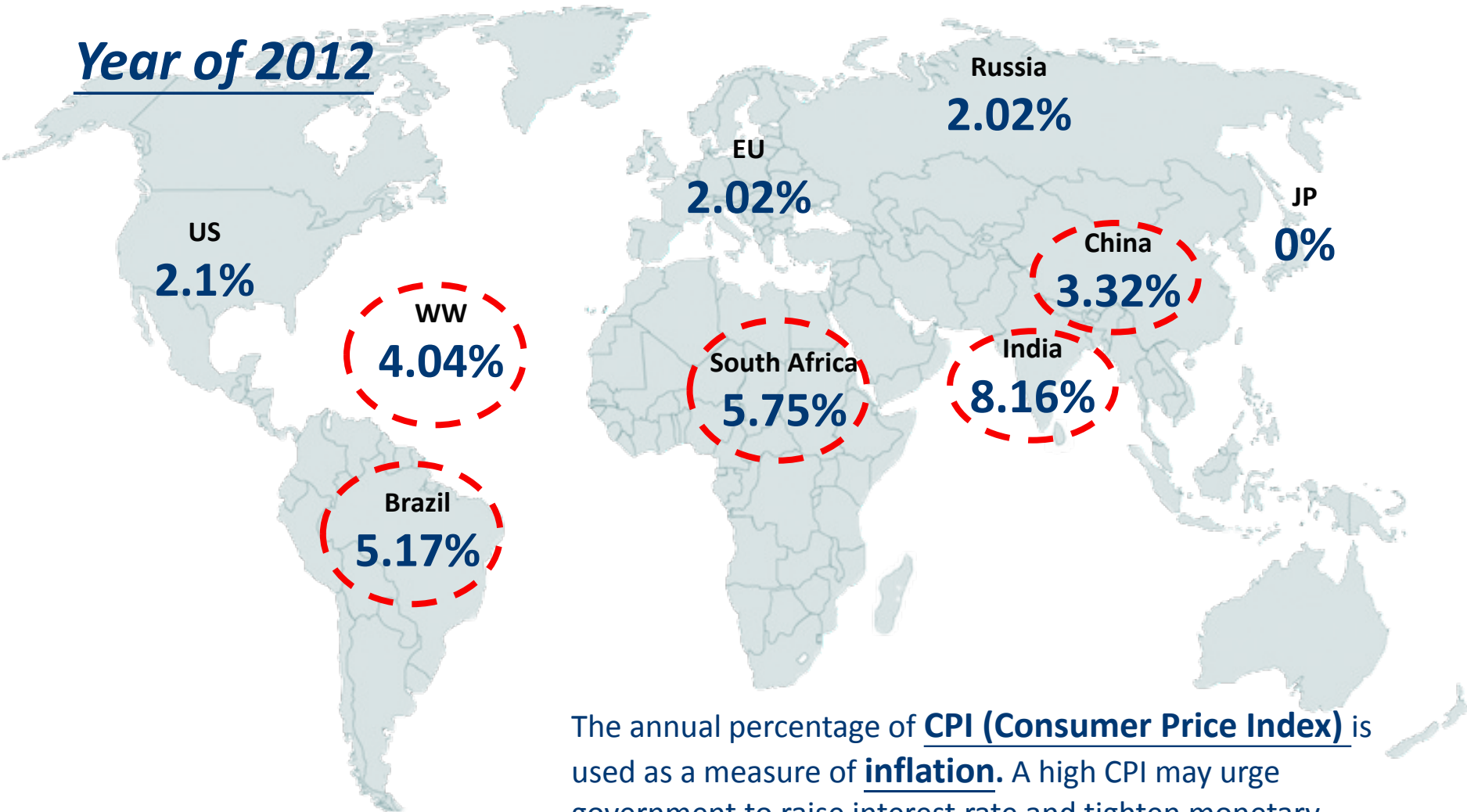
Source: IMF, DRAMeXchange, Jun. 2012

■ 2011 GDP
■ 2012 GDP

However, Uncertainty Remains...

CPI Represents Potential Risk of Inflation among Regions

Year of 2012



The annual percentage of **CPI (Consumer Price Index)** is used as a measure of **inflation**. A high CPI may urge government to raise interest rate and tighten monetary.

Source: IMF, DRAMeXchange, Jun. 2012

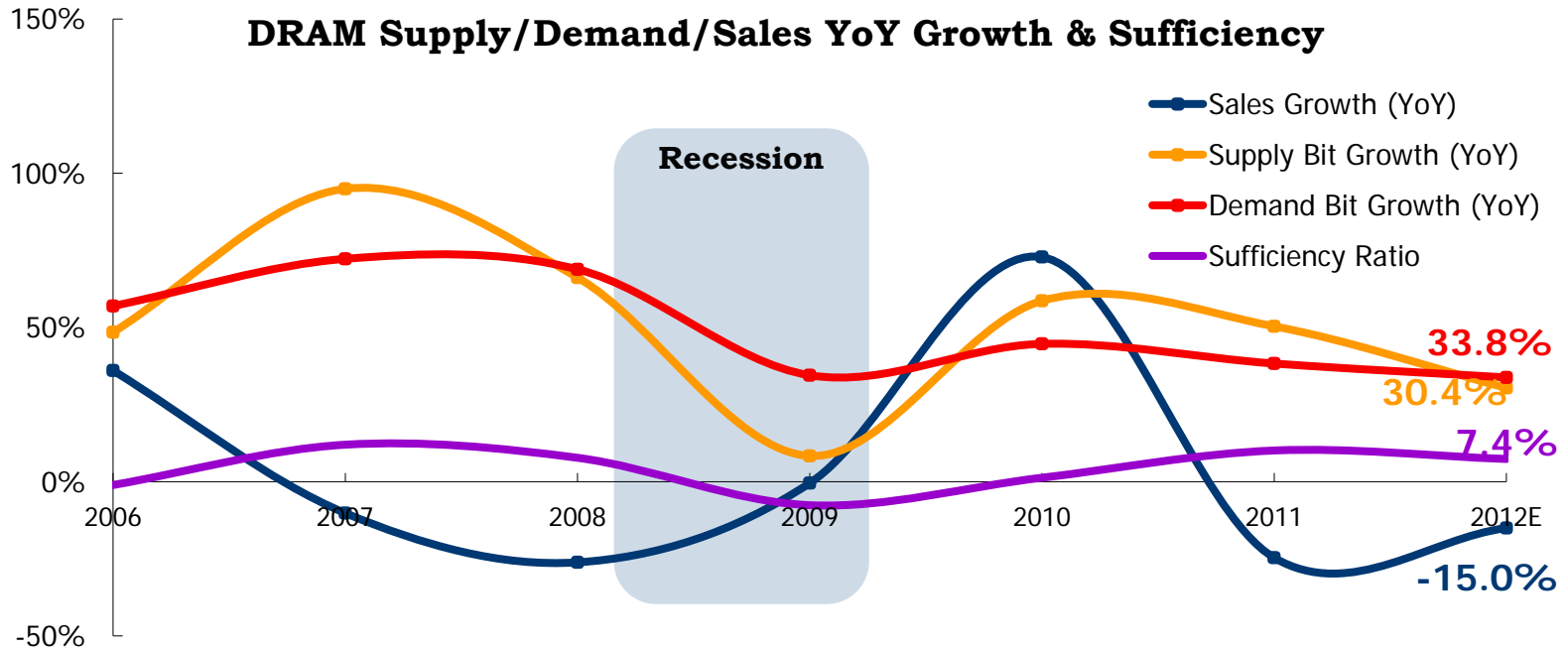
2012 DRAM Industry Outlook

More Rational Market, Revenue Improves Slightly

□ **2012:** Healthier sufficiency (yet still oversupply), ASP (PC+non PC DRAM) drop slows **(YoY ~35%)**

Future key watch points:

- (1) Supply: Status of DRAM capacity withdrawal; Elpida's resolution of financial restructure
- (2) Demand: Stimulations in 2H'12 (Win8, Ultrabook, Intel's Ivy Bridge & Romley)



Source: DRAMeXchange, Jun. 2012

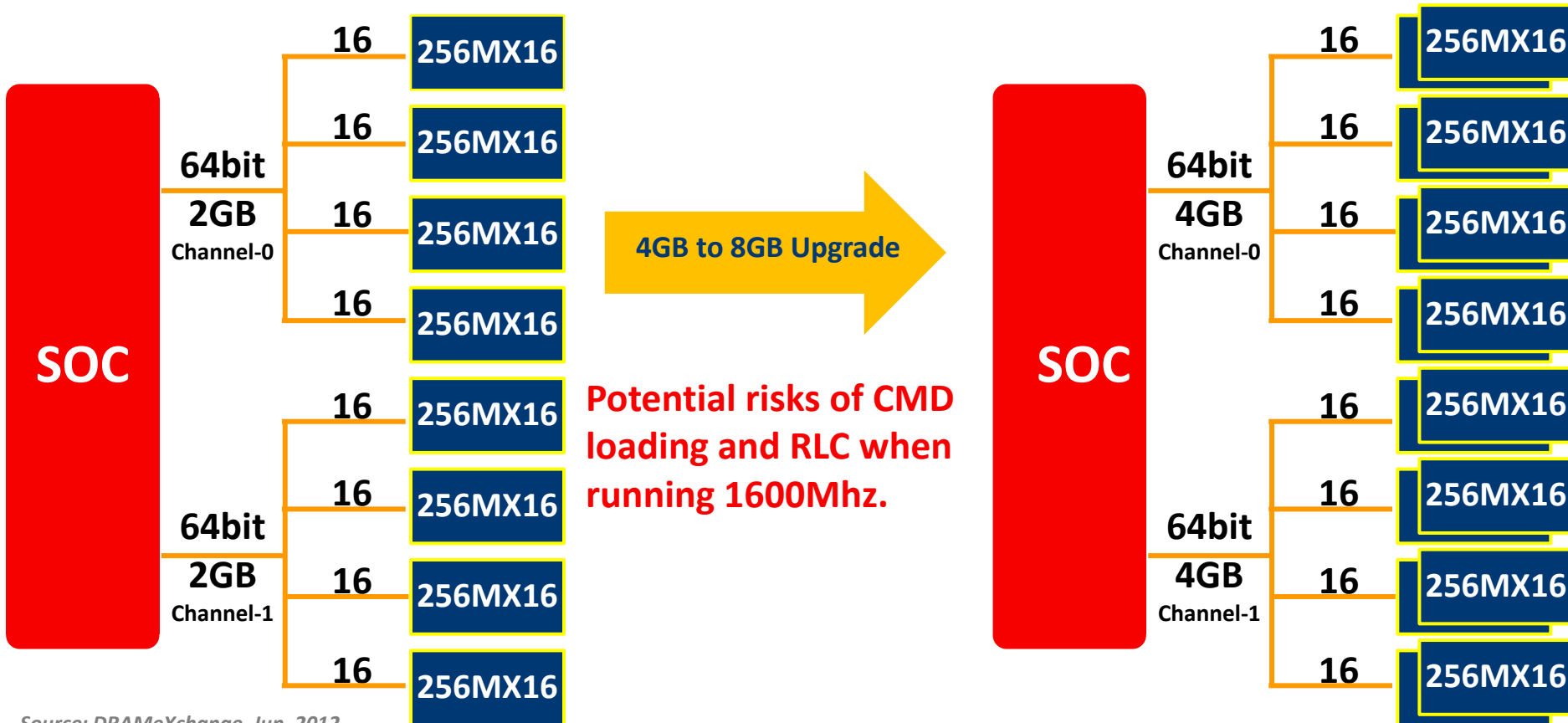
Ultrabook Memory Solution Unsettled

DDR3L, DDR3M and LPDDR3 x16/x32 Are the Options

Segmentation is the Key for Memory Solutions

- ❑ Always Connected: LPDDR3x16/x32; however, x32 product is the only solution that Intel Haswell supports.
- ❑ Not Always Connected: DDR3LMx16 or DDR3Lx16




LPDDR3 x16 Simulation when Ultrabook Density Increases to 8GB



Source: DRAMeXchange, Jun. 2012

2012 Demand Outlook – Mobile DRAM

Smartphone Growth Continues at a Blazing Pace

	Tablet PC	Smartphone	Featurephone
			
High-end, Mainstream Segment	2012 Shipment (E) 76.2M (83.7%)	2012 Shipment (E) 467.5M (77.2%)	2012 Shipment (E) 529M (55%)
	Non-iPad: 8Gb → 16Gb LPDDR2 iPad: 4Gb → 8Gb LPDDR2	H: 8Gb LPDDR2, eMCP and discrete solution M: Various Offering, 4Gb LPDR1/ 8Gb LPDR2	NAND-based MCP 1+512
Low-end Segment	2012 Shipment (E) 15M (16.3%)	2012 Shipment (E) 172.8M (22.8%)	2012 Shipment (E) 428M (45%)
	4Gb → 6Gb LPDDR2	MCP 4+4 or 4+2 LPDDR1 → LPDDR2 (2Q)	NOR-based MCP 32Mb

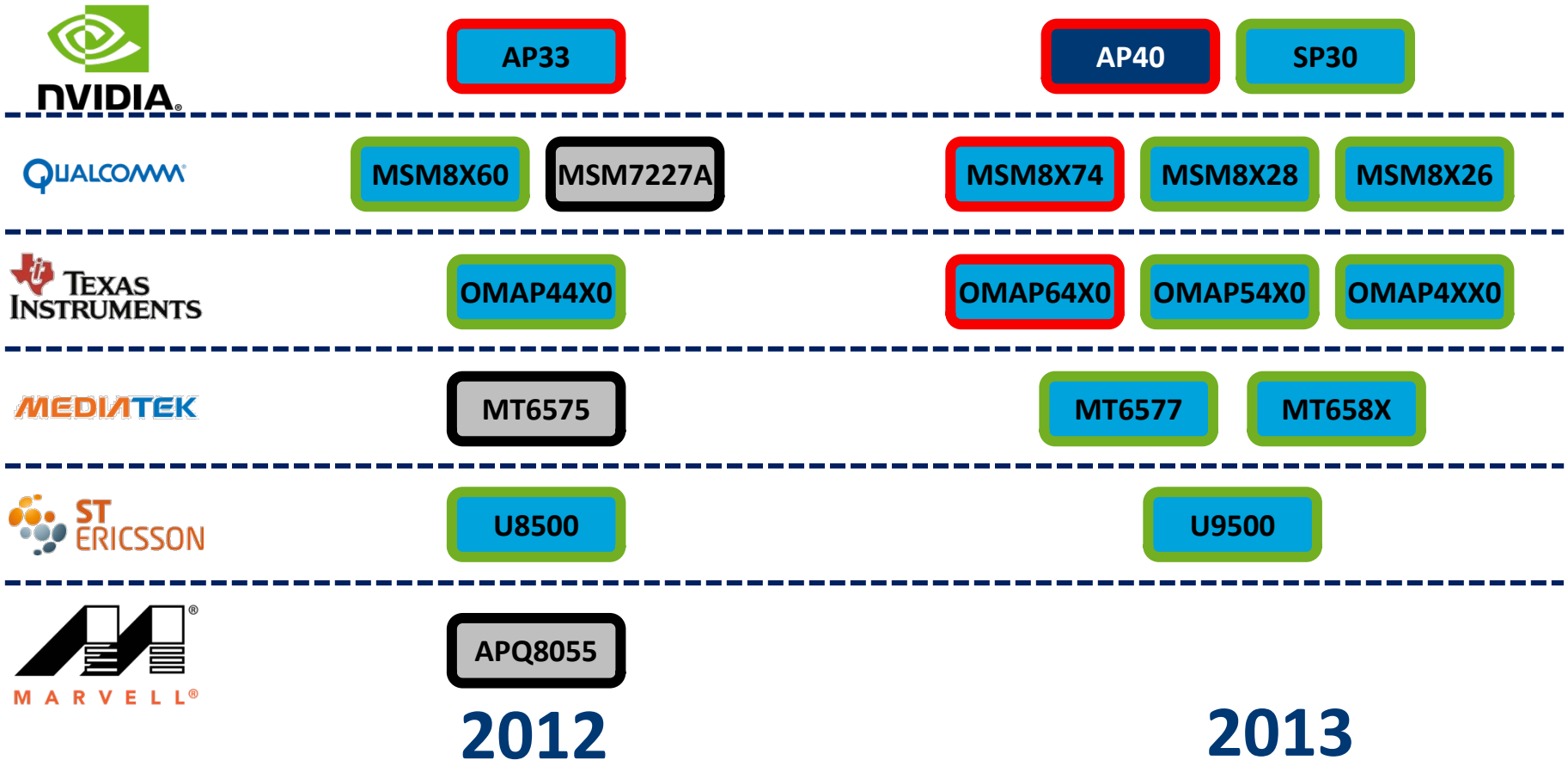
Source: DRAMeXchange, Jun. 2012

2013: Fast Transition in Mobile Market

LPDDR2 & Dual-core Chips Dominate Market

Note 1 : □ Quad □ Dual □ Single

Note 2 : ■ LPDDR3 ■ LPDDR2 ■ LPDDR1

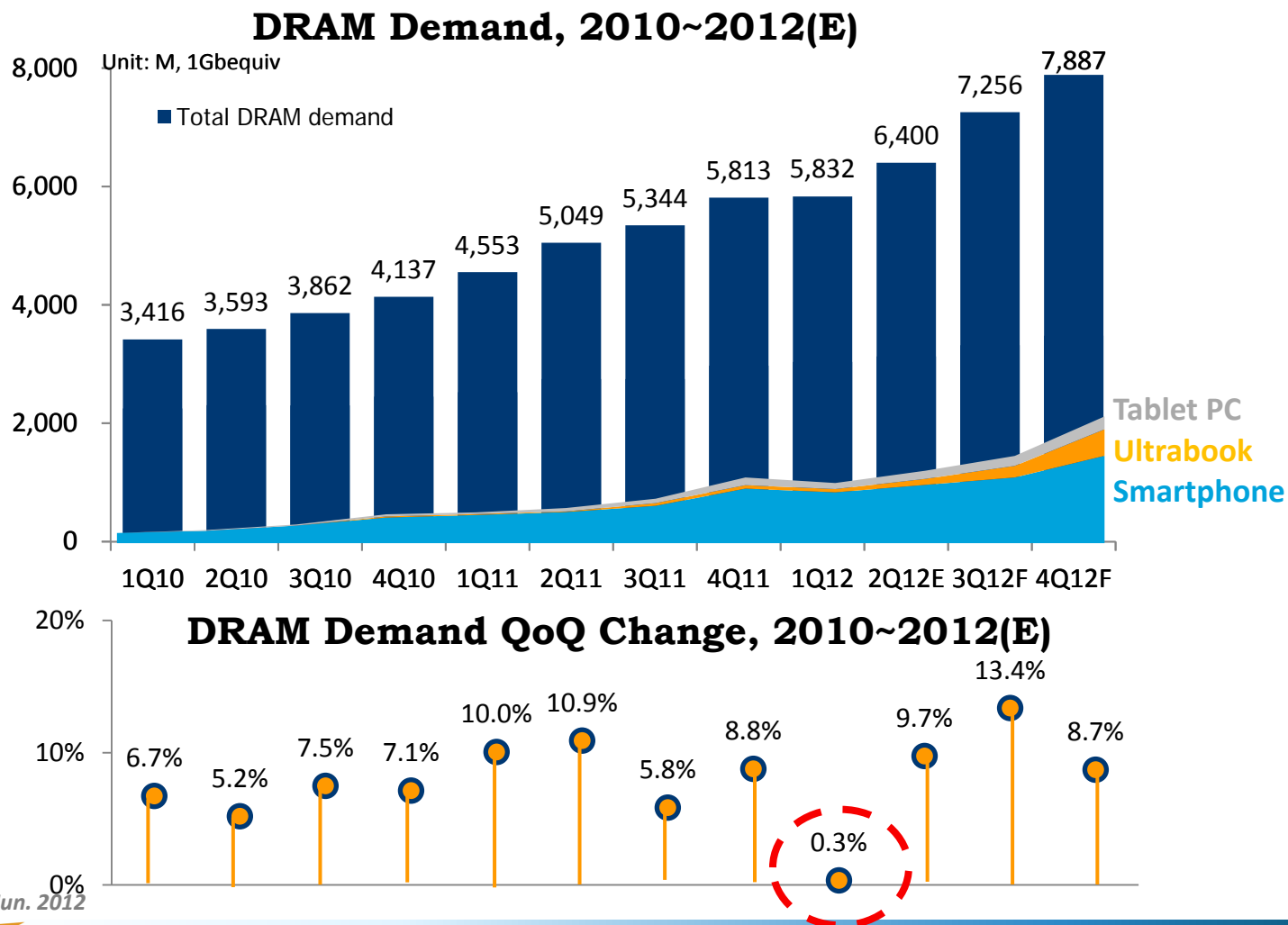


Source: DRAMeXchange, Jun. 2012

2012 DRAM Demand Status

1Q12 Below Seasonal, Demand Gradually Improves from 3Q

- ❑ 1Q12 demand below expectation(weak PC build), oversupply continued.
- ❑ Market estimates demand will improve in 2H, representing stronger seasonality.

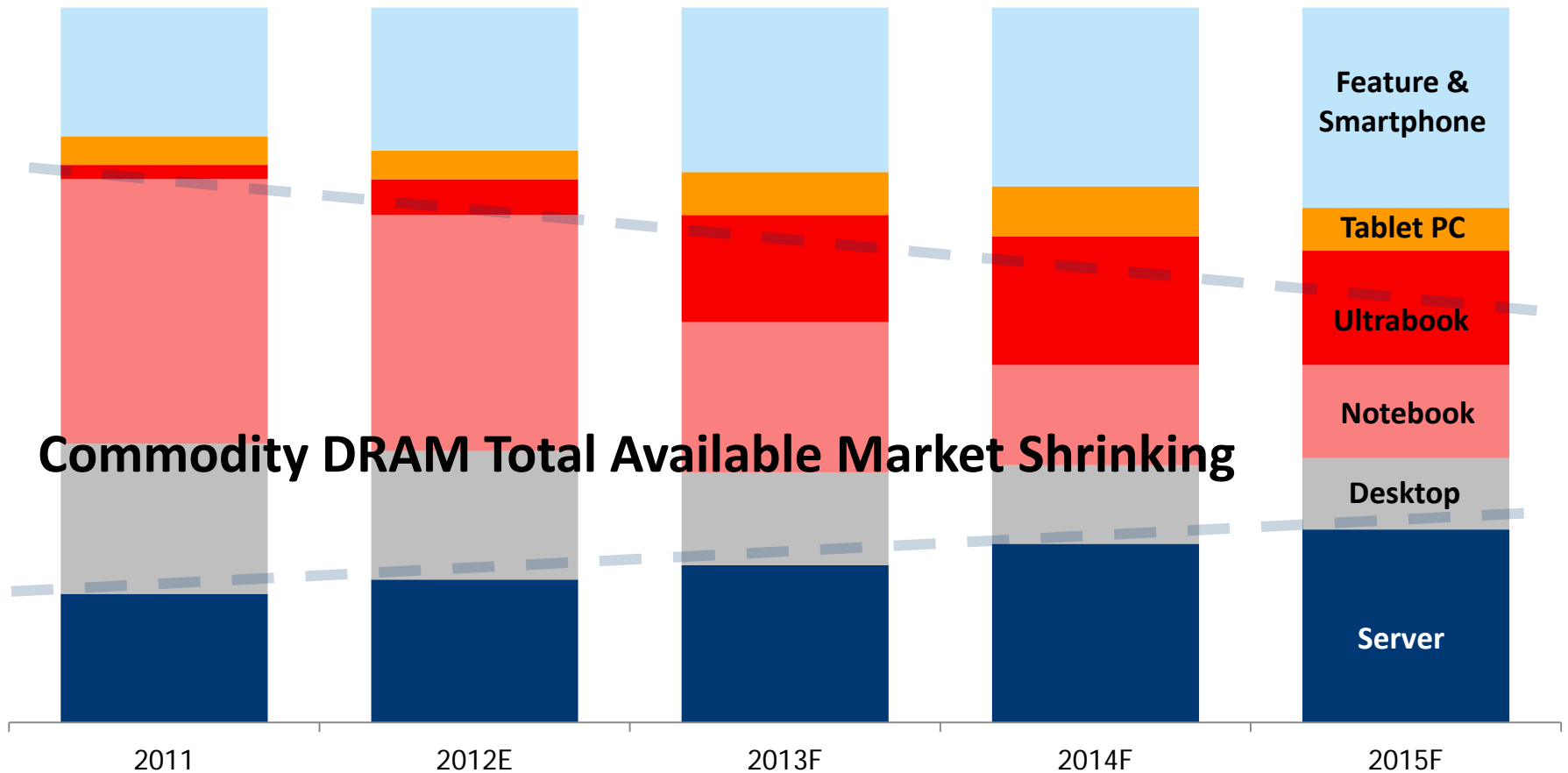


Source: DRAMeXchange, Jun. 2012

5 Years DRAM Demand Landscape

Everything is about Cloud Computing Trend

- Thin and light guarantees the popularity of adoption. Market will be driven by Mobile DRAM and low-power consumption DRAM.
- In 2015, Ultrabook + Cellphone + Server will take majority of DRAM consumption.



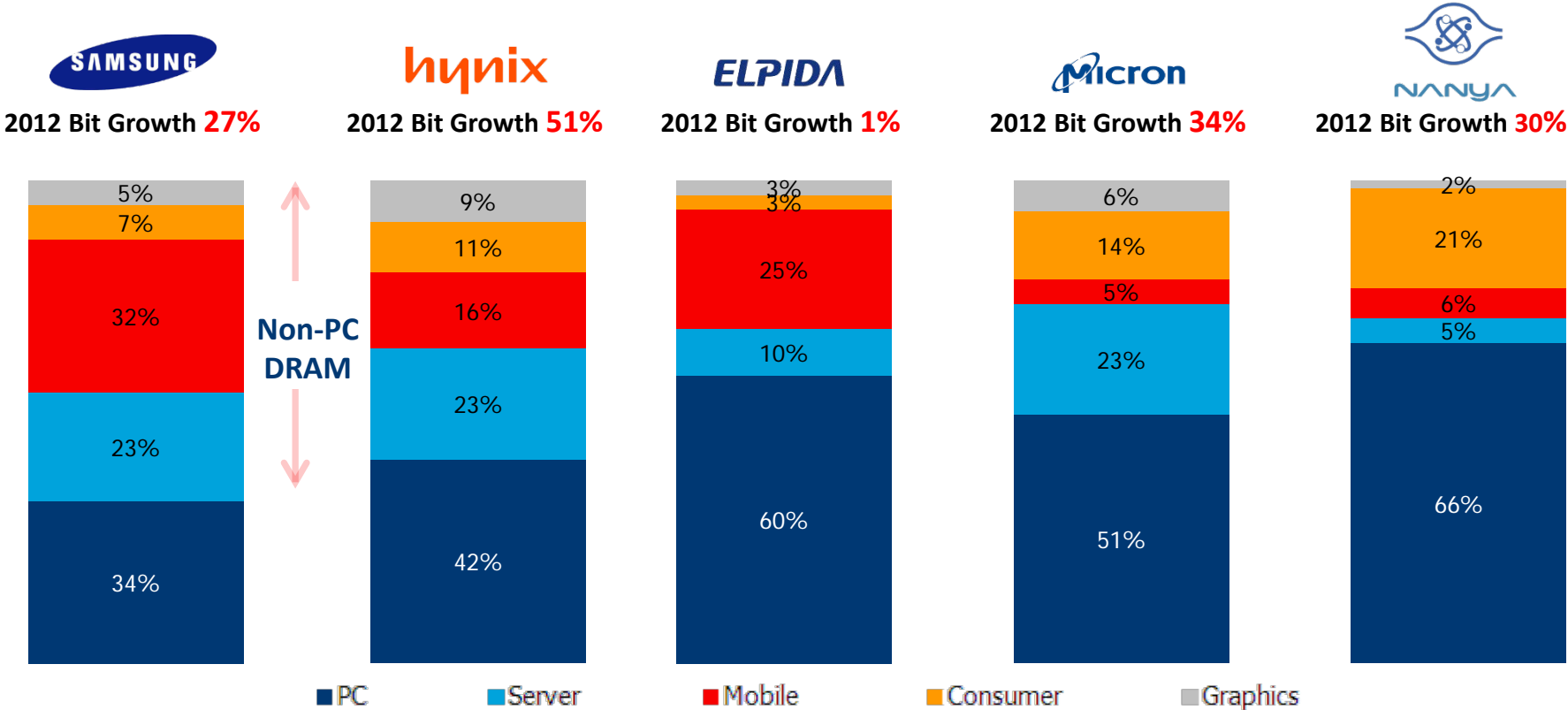
Source: DRAMeXchange, Jun. 2012

The Changing Mix of Supply

Faster Diversification, Better Profitability

- ❑ Samsung, benefitting from strong vertical integration, has highest non-PC contribution.
- ❑ Companies whose PC DRAM portion >50% have to reconsider product mix adjustment.

2012(E) Production Mix by Output Chip



Source: DRAMeXchange, Jun. 2012

Supply Drivers of 2012: Server, Mobile

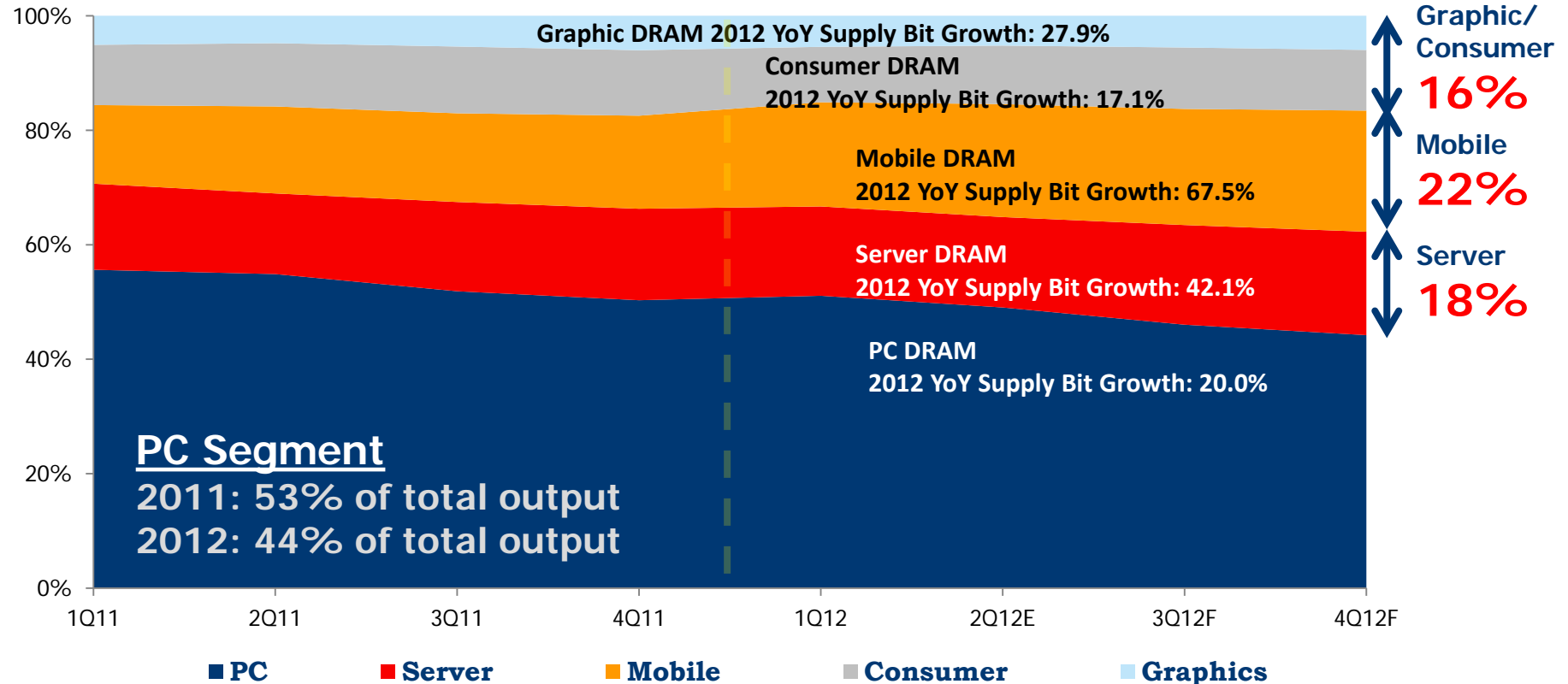
Server and Mobile Take 40% of Total Supply Production

2012: Supply Bit Growth of **30.5%** (v.s. Demand Bit Growth of **33.8%**)

↗ Server, Mobile

↘ PC, Graphic

2012 DRAM Output by Production



Source: DRAMeXchange, Jun. 2012

Winners of PC DRAM Outperform Here, too

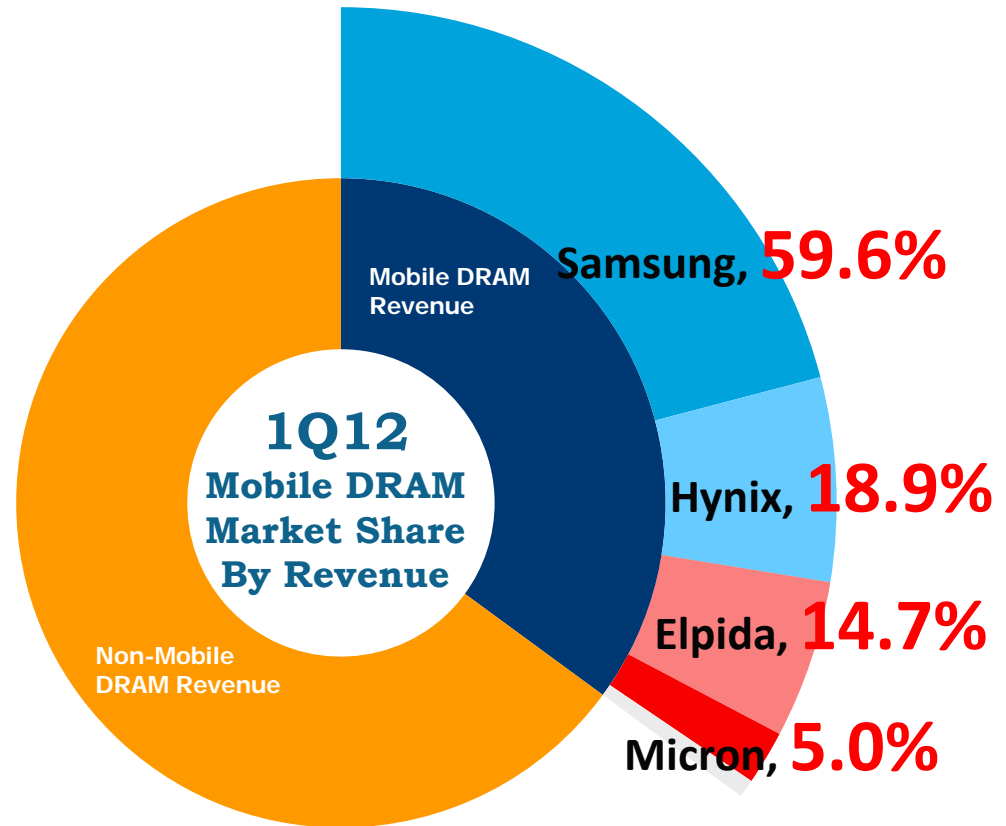
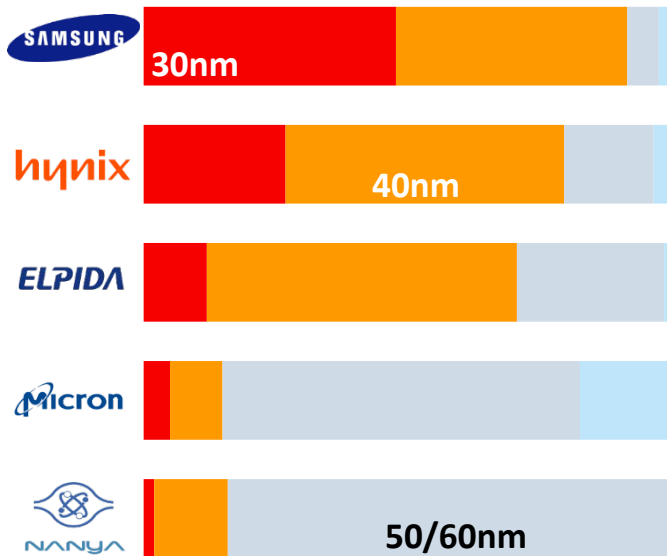
Samsung is By Far the Strongest Leader in Mobile DRAM

1Q12 DRAM Operating Margin

(1)		15%
(2)		-18%
(3)		-68%
(4)		-26%

- Samsung's leadership is unshakable, mainly benefitting from its complete product portfolio and strong Galaxy family sales.

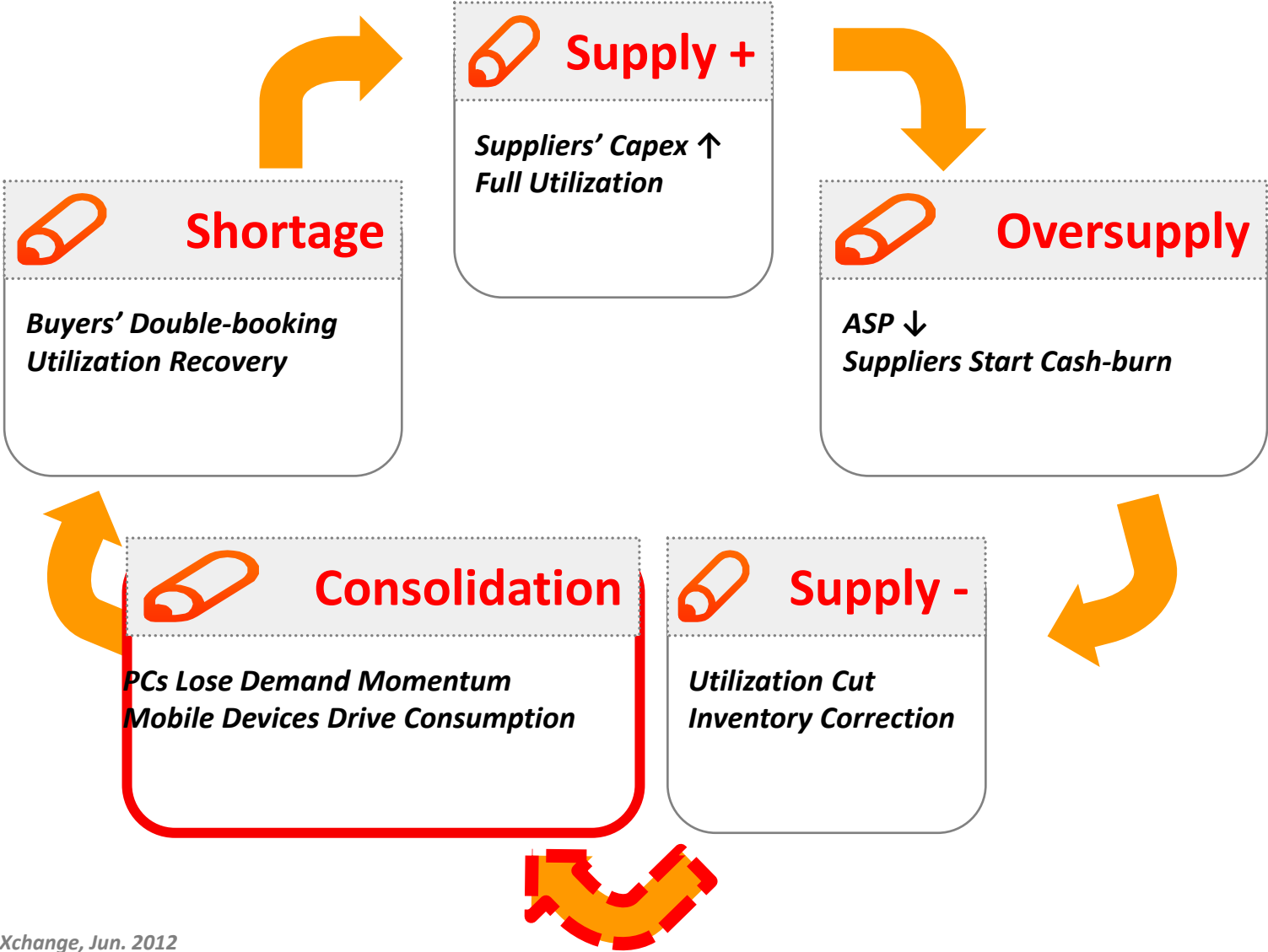
2Q12 Mobile DRAM Node Breakdown



Source: DRAMeXchange, Jun. 2012

The Broken Cycle, A New Battlefield

Consolidation Currently Taking Place

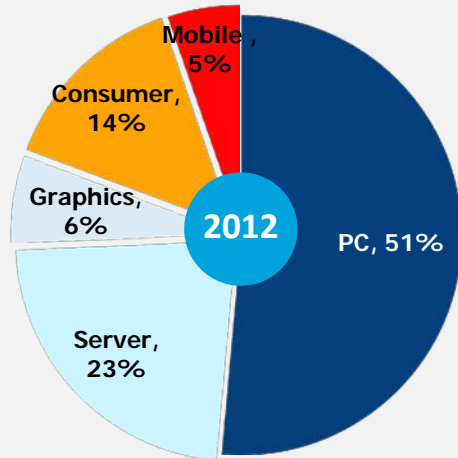


Source: DRAMeXchange, Jun. 2012

A More Complete Product Offering

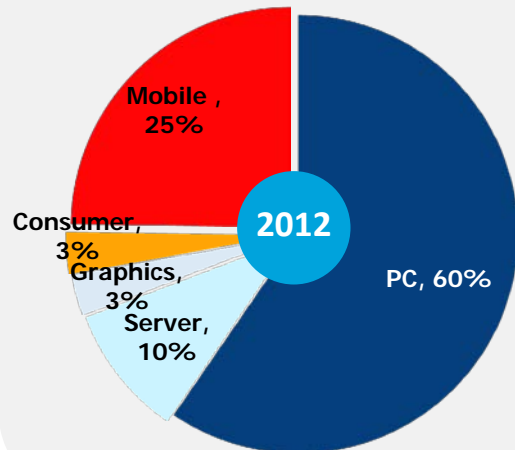
Their Cooperation Makes Up What Insufficient Originally

Micron



2011: PC 55%, S 22%, G 4%, C 15%, M 4%

Elpida



2011: PC 68%, S 7%, G 3%, C 7%, M 14%

Source: DRAMeXchange, Jun. 2012

Micron + Elpida will increase penetration of:

- ❑ Server: Utilizing Micron's customer base
- ❑ Mobile: Micron's NAND + Elpida's Mobile DRAM is competitive, will penetrate high-density MCP market.

Product Diversification Simulation after Integration

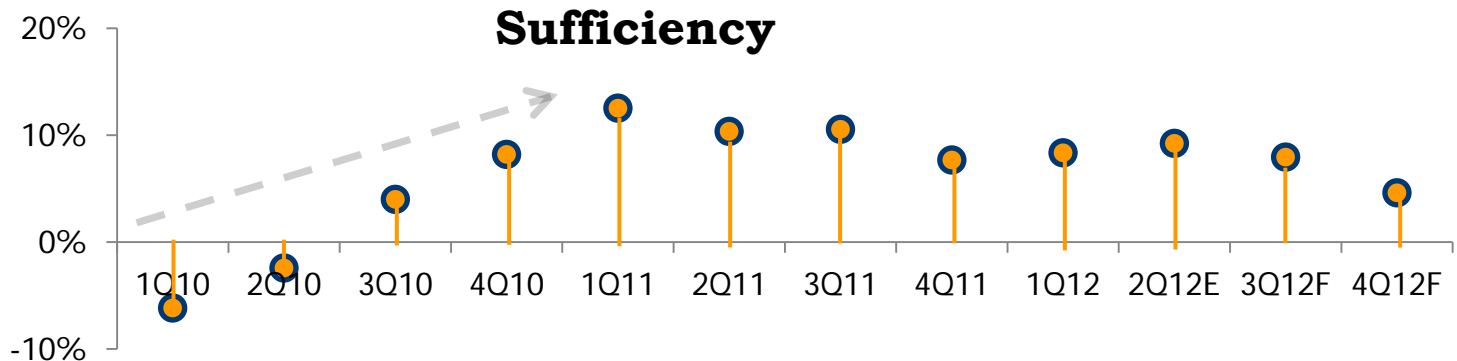
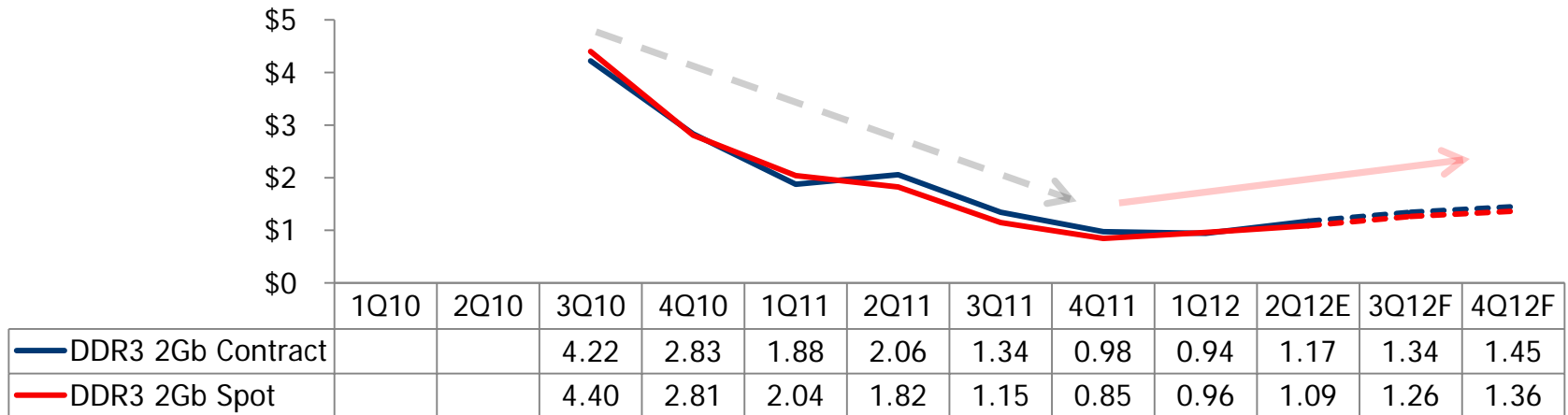
	Chip QTY	%
PC	5,273	49%
Server	1,251	20%
Graphic	453	5%
Consumer	907	10%
Mobile	1,269	16%
Total	9,153	100%

Non-PC DRAM will account for more than **50%** of 2012 output after integration.

De-coupling Trend of ASP & Sufficiency

- Typically, sufficiency ratio is a leading indication of future ASP trend (negatively correlated).
- However, 1H12 ASP trend more strongly reflects supply uncertainty.
- In 2H, a better demand/supply balance will result in more solid ASP development.

DRAM ASP (Contract & Spot)



Source: DRAMeXchange, Jun. 2012

□ DRAM Demand – stimulations in 2H, triggering stronger seasonality

- ✓ By 2012, cloud (server) computing (ultrabook/tablet PC/smartphone) represents majority of DRAM consumption.
- ✓ Ultrabook memory solution decided by product segmentation – DDR3LM, LPDDR3 both applicable.
- ✓ Dynamic changes in smartphone and tablet segments, low-end & cost competitive solutions gaining ground → imposing ceiling on mobile DRAM portion of total BOM cost.

□ DRAM Supply – becoming oligopoly market

- ✓ Less price slashing behavior, representing a more rational market → stable price trend.
- ✓ In 2012, DRAM market still in oversupply, permanent withdrawal of some capacity necessary.
- ✓ Both economies of scale + product diversification are crucial for profitability.

□ DRAM Sufficiency & ASP

- ✓ 1Q → weakest quarter of 2012. 2H'12 ASP gradually move upward (assuming limited impact from China and EU).
- ✓ Suppliers should focus on value-added products: DDR3LM, LPDDR3, on-board memory and DDR4.
- ✓ Commodity & mobile DRAM price gap will narrow – mobile DRAM is becoming commoditized in terms of price.
- ✓ The faster DRAM consolidation occurs, the sooner DRAM ASP bottoms out

Thank You

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