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Case No COMP/M.6214
- Seagate/ HDD
Business of Samsung

Only the English text is authentic.

REGULATION (EC) No 139/2004
MERGER PROCEDURE

Article 8 (1)
Date: 19/10/2011

Brussels, 19.10.2011
C(2011) 7592 final

PUBLIC VERSION

COMMISSION DECISION

of 19.10.2011

addressed to:

Seagate Technology Public Limited Company

**declaring a concentration to be compatible with the internal market
and the functioning of the EEA Agreement
(Case No COMP/M.6214 - Seagate/HDD Business of Samsung)**

(Only the English version is authentic)

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**declaring a concentration to be compatible with the internal market
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(Only the English version is authentic)
(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to the Agreement on the European Economic Area, and in particular Article 57 thereof,

Having regard to Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings¹, and in particular Article 8(1) thereof,

Having regard to the Commission's decision of 30 May 2011 to initiate proceedings in this case,

Having regard to the opinion of the Advisory Committee on Concentrations²,

Having regard to the final report of the Hearing Officer in this case³,

Whereas:

- (1) On 19 April 2011, the Commission received a notification of a proposed concentration pursuant to Article 4 of Council Regulation (EC) No 139/2004 (hereinafter referred to as the "Merger Regulation") by which Seagate Technology Public Limited Company ("Seagate" or "the Notifying Party") acquires within the meaning of Article 3(1)(b) of the Merger Regulation control

¹ OJ L 24, 29.1.2004, p. 1.. With effect from 1 December 2009, the Treaty on the Functioning of the European Union ("TFEU") has introduced certain changes, such as the replacement of "Community" by "Union" and "common market" by "internal market". The terminology of the TFEU will be used throughout this Decision.

² OJ C200. , p....

³ OJ C200. , p....

of the hard disk drive ("HDD") business of Samsung Electronics Co., Ltd. ("the Samsung HDD business") by way of purchase of assets.

- (2) By Decision dated 30 May 2011⁴, the Commission raised serious doubts as to the compatibility of the transaction with the internal market and initiated proceedings pursuant to Article 6(1)(c) of the Merger Regulation were initiated (the Article 6(1)(c) Decision).
- (3) A non-confidential version of certain key submissions of third parties collected during the first phase investigation was provided to the parties on 31 May 2011, 1 June 2011 and 6 June 2011.
- (4) The parties submitted their written comments on the Article 6(1)(c) Decision on 13 June 2011.

I. THE PARTIES

- (5) Seagate designs, manufactures and sells a broad range of computer storage devices, consisting mostly of HDDs and external hard disk drives ("XHDDs"). Its operations are vertically-integrated upstream in the manufacturing of key components, such as read/write heads and thin-film recording media.
- (6) Samsung Electronics Co., Ltd. ("Samsung", South Korea) is active in high-tech electronics manufacturing and digital media. The Samsung HDD Business designs, manufactures, markets and sells HDDs and XHDDs. The Samsung HDD Business is not vertically-integrated upstream in the manufacturing of components, but downstream in the manufacturing of branded XHDDs. Although Samsung is also active in solid state drives ("SSDs"), this business will not be transferred to Seagate.

II. THE OPERATION

- (7) The proposed transaction concerns the acquisition by Seagate of sole control over the Samsung HDD Business. The business to be acquired consists of substantially all tangible and intangible assets used exclusively by Samsung in the research and development, manufacture and sale of HDDs which are owned or leased by Samsung. The remainder of the Samsung undertaking including its SSD business will continue to operate independently post transaction. The parties executed a Term Sheet on 29 March 2011, and signed a Purchase Agreement on 19 April 2011.
- (8) The proposed transaction constitutes a concentration within the meaning of Article 3(1)(b) of the Merger Regulation.

⁴ OJ C 165, 07.06.2011, p. 3.

* Parts of this text have been edited to ensure that confidential information is not disclosed; those parts are enclosed in square brackets and marked with an asterisk.

III. UNION DIMENSION

- (9) The transaction has a Union dimension as it meets the thresholds of Article 1(2) of the Merger Regulation. The parties have a combined aggregate worldwide turnover in excess of EUR 5 000 million (Seagate: 8 064 million; the Samsung HDD Business: [...]*) and a Union-wide turnover in excess of EUR 250 million (Seagate: [...]*; the Samsung HDD Business: [...]*). The parties do not achieve more than two thirds of their Union-wide turnover within one and the same Member State.

IV. THE FRAMEWORK OF THE ASSESSMENT

- (10) The notifying party initiated pre-notification contacts with the Commission on 14 March 2011 and the proposed transaction was publicly announced on the same day that it was notified to the Commission, on 19 April 2011.
- (11) Another transaction affecting the same markets, that is, the acquisition by Western Digital ("WD") of Hitachi's HDD and SSD businesses ("HGST")⁵, was publicly announced on 7 March 2011. WD initiated pre-notification contacts with the Commission on 10 March 2011 and it decided to notify the operation to the Commission on 20 April 2011, that is one day after the notification of the Seagate/Samsung transaction.
- (12) For the reasons that will be explained in Recitals (13) to (18) and consistent with its previous practice, the Commission assessed the present transaction according to a priority principle ("first come, first served" approach) based on the date of notification.⁶
- (13) It should be recalled that assessing the competitive effects of a proposed transaction under the Merger Regulation involves a comparison of the competitive conditions that would result from the notified merger with the conditions that would have prevailed in absence of the merger. In principle, the competitive conditions existing at the time of notification constitute the relevant framework for evaluating the effects of a transaction.⁷ However, in

⁵ Case COMP/M.6203 – *Western Digital Ireland/Viviti Technologies*.

⁶ Previous cases include: Case COMP/M.4601 – *Karstadtquelle/My Travel*, Commission Decision of 4 May 2007 and Case; COMP/M.4600 – *TUI/First Choice*, Commission Decision of 4 June 2007; and Case COMP/M.4942 - *Nokia/Navteq*, Commission Decision of 2 July 2008 and Case COMP/M.4854 - *TomTom/Tele Atlas*, Commission Decision of 14 May 2008.

⁷ See, for instance, Case T-342/99 *Airtours v. Commission* [2002] ECR II-2585, paragraph 82 ("*the level of competition obtaining in the relevant market at the time when the transaction is notified is a decisive factor in establishing whether a collective dominant position has been created for the purposes of Regulation No 4064/89*"), as well Case T-2/93 *Air France v. Commission* [1994] ECR II-323, paragraphs 70-72; Case T-374/00 *Verband der freien Rohrwerke and Others v. Commission* [2003] ECR II-2275, paragraph 170; Case T-279/04 *Éditions Odile Jacob v. Commission* judgment of 13 September 2010, paragraph 327.

some circumstances the Commission may take into account future changes to the market that can reasonably be predicted.⁸

- (14) The Commission takes the view that it follows from these principles and is inherent in the general scheme of the Merger Regulation that a party that is the first to notify a transaction that, assessed on its own merits, would not significantly impede effective competition in the internal market or in a substantial part thereof, is entitled to have its operation declared compatible with the internal market within the applicable time limits of the Merger Regulation. It is neither necessary nor appropriate to take into account future changes to the market conditions resulting from subsequently notified transactions that require approval from the Commission.
- (15) The Commission takes the view that the priority principle, based on the date of notification, is the only one that ensures sufficient legal certainty, transparency and objectivity and respect the other provisions and aims of the Merger Regulation. The Commission recalls that ensuring legal certainty is also one of the primary aims of the Merger Regulation.⁹
- (16) Under the scheme of the Merger Regulation, the date of notification is the only basis for applying the priority principle.¹⁰ It is a clear and objective criterion, determined in all cases in accordance with the rules of Article 5 of Commission Regulation (EC) No 802/2004 of 7 April 2004 implementing Council Regulation (EC) No 139/2004 on the control of concentrations between undertakings¹¹ which lays down a notification-based system of merger control. Other criteria, such as the date that a binding agreement is signed or the moment that a proposed transaction is made public, are also irrelevant and, in any case, very difficult to apply in an objective and transparent manner because they can also lead to uncertainty and arbitrary results. For instance, undertakings that notify a transaction to the Commission may not even know that other undertakings have signed a binding agreement to merge. Consequently, a priority principle based on the date that a binding agreement was signed may create uncertainty since another merger deserving priority over the one being assessed could become known at any time during the administrative procedure (and possibly even after a decision has been adopted).
- (17) The WD/HGST transaction was notified only one day after the Seagate/Samsung transaction. That does not, however, change the above considerations. What matters in law is which transaction is notified first. The principle of legal certainty requires that the same priority rule is applied

⁸ Cf. point 9 of the Horizontal Merger Guidelines, OJ C 31, 5.2.2004, p. 5.

⁹ See, for instance, Case T-251/00 *Lagardère and Canal+ v. Commission* [2002] ECR II-4825, paragraph 97, and the case-law cited there.

¹⁰ See, inter alia, Articles 4, 6, 8 -10 of the Merger Regulation which make clear that its application is based on the notification system. The same is also true with regard to Commission Regulation 802/2004 implementing Regulation 139/2004.

¹¹ OJ L 133, 30.04.2004, p. 1.

irrespective of the various time-periods that may lie between the notifications of transactions affecting the same market.

- (18) In light of the above, the present Seagate/Samsung HDD Business transaction should be assessed in the light of the competitive situation that prevailed at the time of its notification. Therefore, the starting point of the Commission's assessment is a market structure with the following independent HDD suppliers: HGST, Samsung, Seagate, Toshiba, and WD.

V. THE COMPETITIVE ASSESSMENT

5.1. INTRODUCTION TO THE HDD INDUSTRY

5.1.1. Hard Disk Drives

5.1.1.2. The product

- (19) A hard disk drive is a device that uses one or more rotating disks with magnetic surfaces (media) to store and allow access to data. HDDs provide non-volatile data storage, which means that the data remains present when power is no longer applied to the device.
- (20) The main components of a hard drive are the Head-Disk-Assembly (“HDA”) and the Printed Circuit Board Assembly (“PCBA”).
- (21) The HDA includes heads, magnetic media coating (“media”), a head positioning mechanism (head stack assembly - “HSA”) and spindle motor. The disk-pack assembly comprises one or more layered disks (also called platters) positioned around a motor-driven spindle hub that rotates the disks. The more platters a HDD uses, the higher its storage capacity.
- (22) The disk is made up of a substrate material that gives the disk structure and rigidity, and on which thin layers of magnetic materials are deposited which holds the magnetic impulses that represent the data. The materials used tend to differ according to the form factor of the disk (i.e. the standardised size of the platter). For instance, Desktop 3.5" HDDs typically use aluminium substrates, while Notebook 2.5" and smaller form factor HDDs (such as 1.8") tend to use glass substrates.
- (23) The head stack assembly (“HSA”) is comprised of a magnetic positioner, i.e. a pivot-arm module on which the individual heads are mounted. Each disk has a head suspended directly above it (and in some cases, two heads on each side of the disk) which can read data from or write data to the spinning disk.
- (24) The PCBA includes both standard and custom integrated circuits that typically comprise a drive interface and a controller, an interface connector to the host computer and a power connector. Figure 1 illustrates the structure of a HDD:

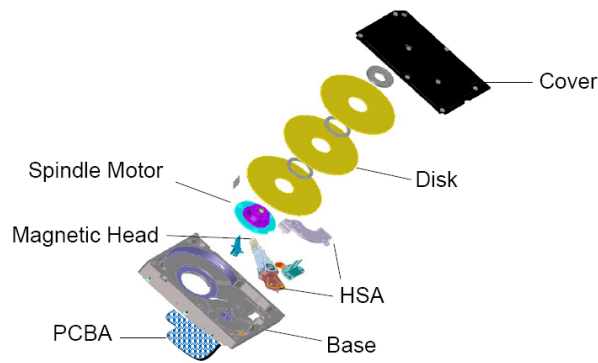


Figure 1: Components of an HDD

5.1.2.2. HDD manufacturing process

- (25) The manufacturing process broadly comprises three steps: (1) component production, (2) assembly (HDA and PCBA), and (3) testing of HDDs. Firstly, as explained in more detail below, Toshiba Corporation ("Toshiba") and Samsung choose to outsource the entire production process of major components such as heads and media to third party contractors. Other suppliers, namely Seagate, WD and HGST, self-supply the large majority of these key components.
- (26) Secondly, assembly of HDDs is generally undertaken by HDD suppliers. The exception is the Samsung HDD Business for which TDK also handles a large part of its HDD assembly.
- (27) Thirdly, HDDs manufacturers test HDDs for errors. This requires the availability of drive test equipment, which adds to the production time. Potential Original Equipment Manufacturers (OEM) customers also conduct extensive testing of HDDs in a qualification process.
- (28) Seagate has four manufacturing facilities dedicated to the production of HDDs (as opposed to design or components), all of them located in Asia (two in China, one in Thailand and one in Singapore). With the exception of the Singapore-based facility which only produces Enterprise drives, each plant manufactures more than one HDD product (such as for Desktop, Notebook and Consumer Electronics (CE) applications).¹² Moreover, Seagate has also read/write head manufacturing operations in Malaysia¹³, and media production facilities in Minnesota, US, and Northern Ireland.¹⁴
- (29) Samsung has a HDD production facility in Korea, and another one in China. Both facilities manufacture 2.5" and 3.5" HDDs. In addition, one of Samsung's subsidiaries located in Brazil (SEDA), is in charge of the final assembly and

¹² Seagate reply to the Commission's request for information of 27 May 2011, question 14.

¹³ Form CO, p. 88.

¹⁴ Seagate reply to the Commission's request for information of 13 July 2011, question 2.

testing of the HDDs produced in the Korea-based facility.¹⁵ TDK also currently contract manufactures HDDs for Samsung. Unlike Seagate, Samsung does not manufacture any of the upstream components used to manufacture HDDs (notably heads and media).

5.1.2. HDD end-uses

- (30) HDDs can be used in a variety of applications such as storage area networks and other business storage systems, desktop and laptop computers and a range of CE applications including digital video recorders, camcorders and gaming devices.
- (31) HDDs are customarily categorised by reference to their end use, in particular:
 - (a) Enterprise HDDs (used in servers and enterprise storage systems), with a distinction between Mission Critical and Business Critical Enterprise HDDs;
 - (b) Desktop HDDs (used for example in PCs and home electronics devices),
 - (c) Mobile HDDs (used for example in laptop PCs and portable electronic devices), and
 - (d) CE.
- (32) A further differentiation of HDDs is possible according to their technical characteristics, such as their size (for example, 3.5", 2.5", 1.8" form factors), rotational speed (seek time), storage capacity¹⁶ and the type of interface.¹⁷
- (33) Table 1 shows the main characteristics which are specific to HDDs belonging to the different end-use applications. The table shows that although there are some technical features which are common to HDDs across different applications, each end-use demands HDDs with certain technical requirements. The table also displays the shares that HDD products at different storage capacity points and rotational speeds represent in the overall sales within the end-use concerned.

¹⁵ Samsung reply to the Commission's request for information of 27 May 2011, question 14.

¹⁶ The storage capacity indicates the amount of data that can be stored on the HDD, commonly expressed as gigabyte ("GB") or terabyte ("TB"). The capacity of HDDs currently ranges between approximately 80 GB and 3 TB.

¹⁷ Interfaces enable data within HDDs to be accessed. Interfaces have been defined as industry standards and currently include SATA and SAS. Legacy interfaces include PATA, FC and SCSI. SATA and PATA were designed for consumer grade applications although SATA has now become the sole interface for new consumer drives. SCSI and FC are still supported by some enterprise grade drives although they have almost entirely been replaced by SAS interface.

End-use	Mobile	Desktop	BC Enterprise	MC Enterprise	CE	External
Features	Shock Performance Low Noise Low Voltage	High Capacity	High Reliability, High Speed	High Reliability, High Speed	3.5" : Streaming 2.5" : Low Capacity 1.8" : Low Voltage	
Functionality	Note PC	DT PC			DVR ¹⁸ , Game Console, DVC	
Capacity	2.5": 160 GB (13%) 250 GB (21%) 320 GB (31%) 500 GB (28%) 650 GB (4%) 750 GB (1%)	3.5": 80 GB (1%) 160 GB (9%) 250 GB (9%) 320 GB (18%) 500 GB (25%) 640 GB (2%) 750 GB (1%) 1 TB (21%) 1.5 TB (5%) 2 TB (9%)	3.5" (94%): 160 GB (4%) 250 GB (1%) 300 GB (2%) 500 GB (5%) 600 GB (1%) 750 GB (1%) 1 TB (29%) 2 TB (50%) 2.5" (6%): 500 GB (6%)	3.5" (65%): 70 GB (1%) 150 GB (6%) 250 GB (1%) 300 GB (20%) 450 GB (19%) 600 GB (18%) 2.5" (35%): 70 GB (2%) 150 GB (18%) 300 GB (13%) 600 GB (2%)	3.5" (72%): 160 GB (10%) 250 GB (4%) 320 GB (17%) 500 GB (31%) 1 TB (7%) 1.5 TB (1%) 2.5" (28%): 30 GB (1%) 40 GB (6%) 50 GB (1%) 120 GB (2%) 160 GB (4%) 250 GB (7%) 320 GB (5%) 500 GB (2%)	3.5" (42%): 500 GB (3%) 1 TB (19%) 1.5 TB (6%) 2 TB (13%) 3 TB (1%) 2.5" (58%): 160 GB (1%) 250 GB (4%) 320 GB (11%) 500 GB (25%) 1 TB (12%)
Speed (Krpm)	7.2 (20%) 5.4 (80%)	7.2 (76%) 5.4 (21%)	10 (10%) 7.2 (85%)	15 (70%) 10 (30%)	7.2 (21%) 5.9 (28%)	7.2 (27%) 5.9 (1%)

¹⁸ Digital video recorders.

End-use	Mobile	Desktop	BC Enterprise	MC Enterprise	CE	External
		5.9 (3%)	5.4 (5%)		5.4 (44%) 5 (1%) 4.2 (6%)	5.4 (68%) 5.2 (5%)
Interface	PATA (1%) SATA (99%)	PATA (1%) SATA (99%)	FC (1%) SAS (16%) SATA (83%)	SCSI (0%) FC (32%) SAS (67%)	IVDR (2%) PATA (12%) SATA (86%)	USB (92%) Ethernet (1%) SATA (7%)
Size (Disk)	2.5" / 1.8"	3.5" / 2.5"	3.5" / 2.5"	3.5" / 2.5"	3.5" / 2.5" / 1.8"	3.5" / 2.5" / 1.8"

Table 1: Characteristics of HDDs per end-use¹⁹

(34) The above segmentations (that is, end-use applications or technical characteristics of HDDs) were also considered by the Commission in its past decisions.²⁰

(35) The four end-use categories are described in more detail below.

5.1.2.1. Enterprise applications

(36) Enterprise applications for HDDs include workstations, servers, network attached storage, storage area networks, other computing systems or subsystems, network-communications and video surveillance.

(37) HDDs employed in Enterprise applications can be further segmented in: (i) Mission Critical HDDs, which are employed in high performance servers or storage arrays; and (ii) Business Critical HDDs which are used in the large storage or server farms of Internet companies like Google and Facebook.

(38) Mission Critical Enterprise HDDs are technically sophisticated and demand superior performance compared to the other types of HDDs. For instance, they offer an ability to read and write simultaneously, allow for higher usage levels and they are designed to operate in more demanding environments with lower failure rates.

¹⁹ The numbers are based on the 2010 transaction data of WD, Seagate, HGST, and Samsung. So, Toshiba, even if present in a given segment, is not included in the numbers. Percentages represent percent shares in sales value.

²⁰ Case No COMP/M.5483 - *Toshiba/Fujitsu HDD Business*, Commission Decision of 11 May 2009.

- (39) Business Critical HDDs (also known as "near-line storage" HDDs), have higher storage capacity than Mission Critical HDDs but do not require the same level of performance. From a technical point of view, business critical storage products have some commonalities with Desktop HDDs. For instance, they typically use the same SATA interface as the mainstream Desktop HDDs. There are however also major differences between the two different types of HDDs. The main difference lies with the heightened level of reliability which is required for Business Critical HDDs that in turn requires a more thorough test process than Desktop HDDs and higher quality components such as heads. The technological complexities associated with creating a superior product translate into a significant price premium of Business Critical HDDs over Desktop HDDs.

5.1.2.2. Desktop applications

- (40) The Desktop segment consists primarily of HDDs that are incorporated in personal computers that are intended for regular use at a single location. Individuals use Desktop computers in homes, businesses and multi-user networks.
- (41) Most HDDs for Desktop applications are based on the 3.5" form factor, which offers the highest storage capacity and the lowest price per GB. However, some Desktop computers (that is, small desktop computers that take up less space) also use 2.5" drives. The 2.5" drives used in those Desktop PCs however represent a very small share of the total drives used in Desktop PCs. According to IDC, in 2010 the percentage of 2.5" HDDs used in Desktop PCs amounted to 3% of the total HDDs employed in those devices, the rest being 3.5" HDDs.²¹

5.1.2.3. Mobile applications

- (42) The Mobile segment consists of HDDs that are incorporated primarily in notebook and netbook computers. Individuals use mobile computers both in and away from homes and businesses. Most Mobile HDDs are produced on the 2.5" form factor and they are generally more expensive than 3.5" Desktop HDDs.
- (43) This is in particular the case as HDDs intended for Mobile devices utilize parts that are more expensive than those used in HDDs that are intended for Desktops. This drives up the price range due to higher input unit costs. For example, Desktop HDDs use aluminium disks whereas Mobile HDDs use glass disks. In addition, Mobile HDDs require additional disks and head units compared to traditional Desktop HDDs to reach the same size capacity due to the absolute area of a 2.5" disk being about half the size of the area of a 3.5" disk, which is used predominantly in Desktop HDDs. Moreover, the 2.5" HDDs are engineered for a higher shock tolerance and lower power

²¹ Seagate's reply to the Commission's request for information of 29 August 2011, question 1.

consumption as compared to Desktop drives given that the former are incorporated into portable devices.

5.1.2.4. Consumer Electronics applications (CE)

- (44) The CE segment includes HDDs that are used in (i) digital video recorders ("DVRs") and satellite and cable set-top boxes ("STBs"), and (ii) game consoles. CE HDDs have certain technical commonalities with Desktop and Mobile HDDs as they use similar hardware. However, they use different firmware codes according to the product application concerned.
- (45) HDDs supplied for CE applications include both 3.5" and 2.5" from factor drives as well as a small volume of 1.8" drives.²² In particular, DVR and STBs (which account for 30% of CE sales), mostly use 3.5" HDDs, while game consoles (which account for 16% of CE sales) shifted from using 3.5" HDDs to 2.5" HDDs in 2005.²³ The requirements for set-top boxes and DVRs (notably higher storage capacity at lower prices) can be best met by the bigger form factor HDDs while the power efficiency demanded by game consoles is offered by 2.5" HDDs.
- (46) As opposed to HDDs used in PC applications (whether Desktop or Mobile), 2.5" and 3.5" HDDs used in CE products are subject to (i) higher usage (power-on-hours/year, read/write GB/day), (ii) higher operating temperature environment, and (iii) higher security features of the compressed, copyrighted, multimedia content they store. As a consequence, HDDs for CE applications are provided with specific firmware codes installed according to the application purpose. The firmware codes carry out certain functions for CE products such as going to "idle mode" to better perform sequential data reading, which is a method of uni-tasking data reading employed on video game consoles and surveillance cameras. In contrast, Desktop and Mobile HDDs are better equipped to handle multi-tasking.²⁴

5.1.2.5. Volumes of HDDs by end use and growth forecasts

- (47) In 2010, the industry shipped just above 650 million HDDs. According to one industry analyst's forecast of February 2011 reproduced in Table 2,²⁵ total output is expected to grow by an average of around 8% per year, to 965 million HDDs shipped in 2015. With the steady growth of notebook computers, Mobile HDDs have become the largest category with 278 million units. They are expected to grow strongly by an average of 15% per year. With 254 million shipped units in 2010, Desktop HDDs are the second-largest category but are forecasted to slightly decline by an average of 1.4% until 2015. Third are

²² The 1.8" drive will not be discussed further as neither Seagate nor Samsung manufacture this type of drive.

²³ Seagate reply to the Commission's request for information of 29 August 2011, question 8, "Citigroup – Hard Disk Drives", at pp. 39-40.

²⁴ Samsung reply to the Commission's request for information of 23 June 2011, question 16.

²⁵ Trend Focus, Storage Interlinks, 17 February 2011, CQ4 '10 Quarterly Update & Long Term Forecast.

HDDs for CE devices with currently 89 million shipped units. They are expected to grow by an average of 9% per year. Lastly, Enterprise HDDs represented only 5% of total HDD shipments in 2010 (but approximately 12% of the industry revenue due to their higher price points). Unit shipments are expected to grow by an average of 1.2% annually until 2015.

	CQ4 '10	CQ1 '11	CQ2 '11	CQ3 '11	CQ4 '11	2010	2011	2012	2013	2014	2015	CAGR
	Actuals	Forecast	Forecast	Forecast	Forecast	Actuals	Forecast	Forecast	Forecast	Forecast	Forecast	
Desktop HDD	64.06	61.20	61.57	66.43	71.20	253.95	260.40	258.25	253.40	245.25	236.45	-1.4%
%	1.8%	-4.5%	0.6%	7.9%	7.2%	10.6%	2.5%	-0.8%	-1.9%	-3.2%	-3.6%	
Mobile HDD	72.70	70.74	69.67	83.71	94.58	278.29	318.70	372.10	428.20	490.60	557.25	14.9%
%	3.9%	-2.7%	-1.5%	20.2%	13.0%	20.0%	14.5%	16.8%	15.1%	14.6%	13.6%	
CE HDD	22.39	21.58	23.22	26.14	26.60	88.91	97.54	107.75	116.00	127.50	139.05	9.4%
%	-6.4%	-3.6%	7.6%	12.6%	1.8%	27.0%	9.7%	10.5%	7.7%	9.9%	9.1%	
Enterprise HDD	8.16	7.65	7.56	8.13	8.83	30.17	32.17	33.02	34.24	33.23	32.06	1.2%
%	12.7%	-6.3%	-1.2%	7.5%	8.6%	17.8%	6.6%	2.6%	3.7%	-2.9%	-3.5%	
Total	167.31	161.17	162.02	184.41	201.21	651.32	708.81	771.12	831.84	896.58	964.81	8.2%
%	2.0%	-3.7%	0.5%	13.8%	9.1%	16.9%	8.8%	8.8%	7.9%	7.8%	7.6%	

HDD market by platform, in units (million)

Table 2: 2010 Volumes of HDDs by end-use and 5-year forecast until 2015²⁶

5.1.2.6. External hard disk drives

(48) HDDs are also the primary input for ("XHDDs"). XHDDs are stand-alone storage solutions that allow users to back up their internal HDDs as well as supplement the storage space of their PC systems, their home and small office networks, or their CE devices. With limited exceptions, XHDDs typically use the same HDDs that are contained in other end-uses such as Mobile and Desktop applications.

(49) Sales of XHDDs are forecasted to grow by an annual average of over 10-20% in volume in the next five years up to approximately over 205 million units in 2015.²⁷

5.1.3. The HDD ecosystem

5.1.3.1. HDD manufacturers

(50) The hard disk drive industry is more than 50 years old and has undergone considerable consolidation ever since IBM invented the first HDD in 1956. While in the mid-1980s, the industry counted up to 85 suppliers, the number of HDD suppliers had fallen to 12 by 2000.

²⁶ Trend Focus, Storage Interlinks, 17 February 2011, CQ4 '10 Quarterly Update & Long Term Forecast.

²⁷ Seagate reply to the Commission's request for information of 26 August 2011, question 28.

* Should read: [among].

- (51) During the last decade, the HDD industry has seen a further wave of consolidation [...] HDD manufacturers. Most notably, Quantum Corporation and Maxtor Corporation ("Maxtor") merged in 2000;²⁸ Hitachi acquired IBM Corporation's HDD business in 2002;²⁹ Seagate acquired Maxtor in 2006;³⁰ and Toshiba acquired Fujitsu Technology Solutions' HDD business in 2009.³¹
- (52) Before the proposed transactions between Seagate and the Samsung HDD Business, and between WD and HGST, HDDs were manufactured by five firms: HGST, Samsung, Seagate, Toshiba and WD.
- (53) The three leading HDD manufacturers in terms of 2010 market shares - Seagate, WD, and HGST - are vertically integrated upstream into media and heads component production.
- (54) Toshiba and Samsung are integrated downstream into the manufacture of PCs (especially notebooks) as well as CE devices.
- (55) The two market leaders, Seagate and WD, are publicly listed companies specialised exclusively in the storage business. HGST, Toshiba and Samsung are part of larger conglomerates active in a variety of businesses.
- (56) There are differences among the product portfolios of HDD manufacturers. From an end-use perspective, Western Digital, Seagate and HGST have broad portfolios covering all end-uses (Enterprise³², Desktop, Mobile, CE). Samsung has a negligible presence in Enterprise. Toshiba is not present in Desktop, does not produce 3.5" CE HDDs, and has only just started to produce HDDs for business-critical Enterprise applications. Table 3 illustrates the portfolios of the various players:

	<i>Enterprise</i>	<i>Desktop</i>	<i>Mobile</i>	<i>CE</i>
WD	•	•	•	•
HGST	•	•	•	•
Seagate	•	•	•	•
Samsung	-	•	•	•
Toshiba	•	-*	•	•#

Table 3: HDD - End Use

²⁸ Case COMP/M.2199 - *Quantum HDD/Maxtor*, Commission Decision of 8 December 2000.
²⁹ Case COMP/M.2821 - *Hitachi/IBM Harddisk Business*, Commission Decision of 2 August 2002.
³⁰ Case COMP/M.4100- *Seagate/Maxtor*, Commission Decision of 27 April 2006.
³¹ Case COMP/M.5483 - *Toshiba/Fujitsu HDD Business*, Commission Decision of 11 May 2009.
³² Western Digital only recently entered the Mission-Critical Enterprise segment/ market and so far has only a negligible presence there.

• = current sales

- = not currently present

* = Toshiba has recently launched a 3.5" business-critical/ non-traditional Enterprise HDD, however, its market presence is still limited.

= Toshiba only produces 2.5" HDDs for CE, not 3.5" HDDs.

(57) From a technical perspective, manufacturers offer HDDs with the following form factors and speed (measured in Revolutions Per Minute – "rpm"):

	1.8"		2.5"			3.5"			
	5400	5400	7200	10000	15000	<6000	7200	10000	15000
WD	-	•	•	•	-	•	•	•	-
HGST	X	•	•	•	•	•	Z	•	•
Seagate	X	•	•	•	•	•	•	•	•
Samsung	•y	•	•	-	-	•	•	-	-
Toshiba	•	•	•	•	•	n.a	n.a	n.a	n.a

Table 4: HDD - Form Factor and Revolutions Per Minute (rpm)³³

• = current sales

Z = sales in the past

X = sales in the past but rpm were lower than 5400

- = not currently present

y = product is understood to have come to the end of its life

n.a=Toshiba has just entered the 3.5" Business Critical HDDs space where its market presence is still limited.

(58) Table 4 indicates some of the differences in the technical portfolios of HDD manufacturers. Seagate and HGST have the broadest portfolio. WD lacks high rotation 2.5" and 3.5" HDDs that are used in high-end Enterprise applications. Toshiba lacks lower speed 3.5" drives as it is not present in the 3.5" Desktop end-use and it just entered the Enterprise Business Critical HDDs space which demands higher rotational speed (7200 rpm). Samsung has the smallest technical portfolio as it lacks higher rotation HDDs (used in Enterprise applications) both for form factors 2.5" and 3.5".

³³ The table is based on the 2010 transaction data of WD, Seagate, HGST, and Samsung. It results from the information contained in the file that Toshiba produce 1.8" and 2.5" HDDs at the different rpm displayed in the table.

5.1.3.2. HDD component makers upstream

- (59) Over the last few years, there has also been significant consolidation among manufacturers of key HDD components, notably suppliers of read/ write heads, spinning disks and spindle motors.
- (60) As for read/ write heads, SAE Magnetics (HK) Limited ("TDK") is now the only provider of heads in the merchant market for read/ write heads. Toshiba and Samsung exclusively rely on TDK's heads. All other HDD suppliers self-supply a majority of their read/ write head needs. This production is reserved for internal use only. However, HGST, Seagate and WD also purchase TDK's heads to help manage peaks in demand and to keep up with competitive technologies.
- (61) There are a limited number of suppliers of HDD media in the merchant market, including Showa Denko and Fuji Electric. Seagate, WD, and HGST self-supply a large portion of their media needs.
- (62) Merchant providers of spindle motors include NIDEC and Minebea. No HDD provider is vertically integrated upstream into spindle motors.³⁴

5.1.3.3. Different HDD customer groups

- (63) HDD customers are Original Equipment Manufacturers ("OEMs"), Original Design Manufacturers ("ODMs"), distributors and retailers.
- (64) OEMs purchase HDDs, either directly or through a contract manufacturer such as an ODM, and assemble them into the computers or systems they build. Distributors, such as Ingram-Micro, Avnet, or Synnex, typically sell HDD products to small OEMs, dealers, systems integrators, online retailers and other resellers. Their main added value is expertise in logistics. Retailers typically sell HDD products – mostly XHDDs - directly to end-users through their storefront or online facilities.
- (65) Seagate's sales to OEMs accounted for [...] % of its revenues generated by HDDs sales in 2010 while Samsung's sales to OEMs represented only [...] % of its total revenues from sales of HDDs in the same business year³⁵.

5.1.4. Innovation and technology trends

- (66) The HDD industry historically has been characterized by significant advances in technology and rapid product life cycles. Significant developments in the HDD industry include the continuous increase in areal density and overall capacity, read/write speed, and the incremental decrease of production costs

³⁴ Samsung sourced spindle and/or motors externally until 2008 when Samsung Electro-Mechanics began manufacturing and selling motors. Such supply accounted for approximately [10-20] % of its motor components for HDDs in 2010. Form CO, p. 68.

³⁵ Seagate's reply of 13 June to the Article 6(1)(c) Decision of 30 May 2011, p. 7.

which is reflected in declining prices both overall (that is to say, per HDD product) and per GB. Other aspects include, for instance, improved portability and energy consumption.

- (67) Western Digital and Seagate are leading absolute expenditure on R&D among HDD manufacturers.³⁶ Measured as a percentage of total revenue, R&D expenditures of HGST have increased in recent years and now broadly match the leading companies. Samsung's R&D investments has been inferior to that of other manufacturers.
- (68) Broadly speaking, innovation efforts of the HDD industry are focused on (1) extending the viable life of current technologies (incremental innovation) and (2) new enabling technologies.

5.1.4.1. Innovation in the HDD industry

- (69) HDDs are equipped with standard interfaces which allow customers to replace any given manufacturer's HDD product with a competitor drive. This helped drive incremental innovation to improve the drives' capacity, design of heads or media, or their architecture and mechanical engineering.
- (70) An important area for innovation is to increase the storage capacity of HDDs. The storage capacity of a disk drive is determined not only by the number of disks it contains but also by the areal density capability³⁷ of those disks. Current Perpendicular Magnetic Recording ("PMR") head technology is likely to allow for continued increases in areal density for the next few years. However, HDD makers [...] recent areal density growth levels of roughly 40% annually based on PMR technology, as the technological advances required have become more complex.³⁸
- (71) Incremental innovation leads to fairly short product cycles. Therefore, it is important for HDD manufacturers to be first to market or bring to market a similar product shortly afterwards. Given the short life cycles of HDD products suppliers must strive to quickly achieve volume production for each new storage size of drives to reduce production costs and benefit most from the temporary lead on any given product.
- (72) The [...] significant HDD technology – PMR – was commercially introduced in 2005. The next intermediate technology is expected to be shingled magnetic recording (SMR),³⁹ which will alter the way a disk is written onto in order to

³⁶ The Commission does not have data on the R&D expenditure by Toshiba's HDD business.

³⁷ Areal density is a measure of storage capacity per square inch on the recording surface of a disk.

* Should read: [find increasingly hard to match].

³⁸ Form CO, pp. 90-91; Deutsche Bank, *The HDD Industry - A changing landscape*, 11 May 2010, at p. 13.

* Should read: [latest].

³⁹ Shingle magnetic recording involves partially overlapping recording tracks (like shingle roof tiles) thereby increasing density on the disk to more than 1 terabit per square inch. By contrast, the currently

increase capacity. [Confidential information on Seagate's roadmap]*.⁴⁰ Other future technologies to increase areal density on which HDD companies are working include microwave-assisted magnetic recording⁴¹ or heat-assisted magnetic recording⁴², as well as bit patterned recording.⁴³

- (73) Hybrid-HDDs are a recent innovation. They combine a traditional drive, and its capacity advantages, with flash memory and its performance advantages (on flash memory and Solid State Drives ("SSDs"), see Recital (74)). By using the embedded flash memory portion of the drive for the most commonly accessed data, a hybrid drive is faster than traditional HDDs. At the same time, they are much cheaper than SSDs, as they use far less NAND flash than SSDs and instead rely primarily on the HDD for capacity. Seagate has recently begun to commercially offer hybrid HDDs and is currently the only HDD manufacturer to do so.

5.1.4.2. Technology trends in the storage industry

- (74) An SSD is a storage device that uses semiconductor, non-volatile media such as NAND Flash memory⁴⁴, rather than magnetic media and magnetic heads. SSDs record, store and retrieve digital data without any moving parts. Most SSD manufacturers use non-volatile NAND flash memory because of its lower cost and ability to retain data without a constant power supply, which ensures data persistence through power outages. SSD manufacturers are able to replicate traditional mechanical HDD form factors (1.8", 2.5", and 3.5"). SSDs can also use dynamic random-access memory (DRAM). DRAM provides faster data access, but because it loses its stored information when the memory is powered down, DRAM-based SSDs typically need an internal battery and/or backup disk systems to ensure data persistence.
- (75) The benefits of SSDs compared to HDDs include increased speed, lower power consumption, increased resistance to shock, and reduced noise and heat generation. SSD drives are also smaller and easier to fit into small devices

used perpendicular recording allows only for densities of around 530 Gbits per square inch. (Form CO, p. 91).

⁴⁰ Form CO p. 92.

⁴¹ In microwave-assisted magnetic recording, a high-frequency magnetic field is applied to a microscopic region of the recording media which eases the process of writing data and increases the number of bits that can be stored on the disk to up to 10 terabits or more per square inch.

⁴² In HAMR, a laser is mounted on the head and used to heat the platter in order to increase the capacity of the platter.

⁴³ Bit-pattern recording is expected to allow a storage density of 2.5 terabits per square inch. Such a density is possible because the procedure places individual bits on lithographed 'islands' of magnetic material which protects each bit's charge, thereby allowing said sectors to be far smaller than would otherwise be possible. Form CO, p. 92.

⁴⁴ NAND flash memory is a type of non-volatile storage technology that does not require power to retain data. There are two types of flash memory, NAND and NOR. The names refer to the type of logic gate used in each memory cell. (Logic gates are a fundamental building block of digital circuits). NOR flash was first introduced by Intel in 1988. NAND flash was introduced by Toshiba in 1989.

since they do not require a specific shape determined by the size of the platter⁴⁵.

(76) The benefits of SSDs are already evident for those enterprise servers that require very fast access to data in storage. In these circumstances, the higher speed of SSDs over HDDs has made SSDs more competitive. By increasing the access speed to stored data, in some cases fewer servers are required. This can represent a substantial saving.⁴⁶ Currently, SSDs are also used in either embedded systems (examples include telecom, point-of-sale, or industrial measurement equipment) or as storage solutions for CE applications with low capacity and high portability requirements (examples include tablets or ultra-portable devices).

(77) Notwithstanding this, SSDs are available in lower capacity points than HDDs, and they cost significantly more per GB than HDDs. As a consequence, PC OEMs currently need to pay a significant price premium to employ SSDs in their devices as shown in Table 5 and Table 6.

	2007	2008	2009	2010
SSD Average Capacity	10 GB	19 GB	58 GB	91 GB
HDD Benchmark capacity	12 GB	20 GB	60 GB	80 GB
SSD ASP	[\$300-400]*	[\$100-150]*	[\$200-300]*	[\$200-300]*
HDD ASP at Benchmarked Capacity	[\$50-60]*	[\$30-40]*	[\$50-60]*	[\$50-60]*
HDD Average ASP	[\$60-70]*	[\$60-70]*	[\$50-60]*	[\$50-60]*

Table 5: SSD and HDD Historical ASP⁴⁷

Source: Gartner August 2010 and Seagate Market Facts Dataset. 2010 SSD ASP is an estimate

	2007	2008	2009	2010
SSD Average Capacity	10 GB	19 GB	58 GB	91 GB

⁴⁵ Form CO, p. 41.

⁴⁶ Ibidem.

⁴⁷ Samsung reply to the Commission's request for information of 20 April 2011, Annex 1.

HDD Benchmark capacity	12 GB	20 GB	60 GB	80 GB
SSD \$/GB	[\$30-40]*	[\$5-10]*	[\$0-5]*	[\$0-5]*
HDD \$/GB at Benchmarked Capacity	[\$0-5]*	[\$0-5]*	[\$0-5]*	[\$0-5]*
HDD \$/GB Average	[\$0-1]*	[\$0-1]*	[\$0-1]*	[\$0-1]*

Table 6: SSD and HDD Historical ASP/GB

Source: Gartner August 2010 and Seagate Market Facts Dataset. 2010 SSD \$/GB is an estimate

(78) A 2009 TrendFocus study⁴⁸ points out that the lower price mainstream computing SSDs were approaching USD 1.60 per GB at the OEM level, while mobile computing HDDs were USD 0.15 per GB – an advantage of more than ten times the cost per GB.⁴⁹ Therefore, PC OEMs could offer HDD storage capacities ranging from 160 GB to 320 GB for a cost of less than USD 40 to the low USD 50 range, while a SSD of 128 GB cost an OEM over USD 200, i.e. four or five times as much with less than half of the total capacity of the average HDD. A study by Gartner from March 2011 predicts that at the PC level, even in 2015, there will be an approximate 10x cost-per GB advantage of HDDs over SSDs. The study further forecasts that a 1TB or 2TB HDD will likely cost USD 29 in 2015, while 320 GB of packaged PC-grade SSD NAND flash will likely cost USD 85. In other words, even with a 3 to 6x lower capacity, the SSD drive will still be approximately 300% as expensive.⁵⁰

(79) Another industry study concludes that "there is currently very little to recommend SSDs as an alternative to HDDs in the notebook market", as SSDs performance advantages do not justify the considerably higher price. "Table 7 demonstrates that SSDs and HDDs have essentially the same weight, power, size, and shock resistance IOPS are a bit faster for SSDs, but as mentioned, write speeds continue to be an issue and the operating system continues to be an inhibitor to realizing the full potential of SSD read speeds in a typical laptop computer. When it comes to capacity and cost, HDDs win hands down."

⁴⁸ TrendFocus of 29 June 2009, Focus on Update: Solid State Drives, p. 11, submitted by Seagate on 31 August 2011.

⁴⁹ Another research report puts the cost per GB advantage even higher at 17 times in 2009 (USD 3 for average MLC-based NAND vs. USD 0.17 per GB in an average Mobile HDD). Deutsche Bank, *The HDD Industry - A changing landscape*, 11 May 2010, p. 27.

⁵⁰ John Monroe, Joseph Unsworth, Gartner presentation of March 2011, "Media Tablets: Enlarging the Library of Forms in Which Storage is a Necessary Element. 1Q11 SSD/ HDD Forecast Scenarios.", submitted by Seagate on 31 August 2011.

	2.5" Intel SSD X25-M SATA	2.5" Seagate HDD Momentus (5400 rpm)	1.8" Toshiba HDD MK-family (4200 rpm)	Comments
Cost	160GB retails for ~\$425	160GB retails for ~\$50	120GB retails for ~\$120	Much higher \$/GB cost with SSD
Capacity	160/80GB – MLC NAND	640/500/320/250/160GB	250/160/120GB	SSDs offer lower capacity
Weight	3oz/86 grams	3.9oz/110 grams	2oz/62 grams	Little SSD advantage with overall NB weight of 2.5lbs to 8lbs.
Power	Read/Write 0.15W Idle/Standby 0.06W Average 0.1W	Read/Write 1.6W Idle/Standby 0.7W/0.2W Average 1.3W	Read/Write 1.2W Idle/Standby 0.4W Average 0.8W	Adds ~5 mins of extra battery life
Size	Same as 2.5" HDD	.374' x 2.75' x 3.95'	.31' x 2.13' x 3.09'	No advantage of SSDs
Volume	Same as 2.5" HDD	4 cu in	1.8 cu in	No advantage of SSDs in overall NB volume of 70 to 250 cubic inches
IOPS	250MB/s Read/70MB/s Write 0.11ms Latency	61 MB/s sustained internal 5.56ms Latency 300 Max external	65 MB/s sustained internal 5.5ms Latency 708 Mbps Max	SSDs are very useful in high read IOPS situations, write speeds are slower
Shock (Operating)	1000G	350G	500G	Rest of NB still fragile, particularly LCD
Operating temp.	0~70 deg C	0~60 deg C	5~55 deg C	Same

Source: Company data sheets and DB estimates

Table 7: SSD v. HDD comparison on key metrics

- (80) Samsung and Toshiba are leading manufacturers of NAND memory flash and produce SSDs. WD and HGST also manufacture SSDs.
- (81) As part of the purchase agreement for Samsung's HDD business, Seagate has concluded a NAND flash memory supply agreement under which Samsung will provide Seagate with its semiconductor products for use in Seagate's enterprise SSDs and hybrid drives.⁵¹
- (82) A last technological development to note is cloud computing - a new computing technology that may in the long term affect where the storage is located and may thereby impact the HDD industry. Cloud computing delivers shared resources, software and information to users on demand on a multitude of devices, such as client PCs and handheld computing devices. Most cloud computing models consist of services delivered through common data centres that utilise servers and hard drives designed for the enterprise space. The question arises whether cloud-based storage diminishes the overall need for localized data storage and/ or accelerates the adoption of (lower capacity) SSDs.

⁵¹ Seagate, Press release of 19 April 2011, "Seagate and Samsung Announce Broad Strategic Alignment", <http://www.seagate.com/ww/v/index.jsp?locale=en-US&name=samsung-seagate-alignment-announce-pr&vgnextoid=d00a78162ab6f210VgnVCM1000001a48090aRCRD>.

5.2. THE RELEVANT MARKETS

5.2.1. Relevant product markets (HDDs)

5.2.1.1. Demand-side substitutability

The View of the Notifying Party

- (83) The Notifying Party takes the view that due to demand and supply-side substitutability among different HDDs, the relevant product market should at least include all HDDs, with the possible exception of Enterprise Mission Critical HDDs. Accordingly, the Notifying Party points out that the distinction of HDDs on the basis of the end-use (for example Desktops, Mobile PCs and tablets) is increasingly blurred for the following reasons:
- (84) First, HDDs that are sold for different end-uses are technically the same. As an illustration, 2.5" SATA HDDs with 5,400 or 7,200 rpm motors may be used in notebooks, desktop PCs and CE applications as well as external hard drives.
- (85) Second, the same end-use applications may employ HDDs with different technical specifications (e.g. either 2.5" or 3.5" form factor) as in the case of Samsung's U250 all-in-one PC which is available in either 2.5" or 3.5" form factor.
- (86) Third, rapid technological developments often lead customers to consider one type of HDD suitable for applications that were typically associated previously with a different HDD type before. In the first half of this decade, Enterprise HDDs almost exclusively used the 3.5" form factor. However, as of 2004-2005, OEMs began to use 2.5" drives in Enterprise applications and now one industry analyst, TrendFocus, anticipates that the 2.5" form factor will become the best-selling form factor in the Enterprise space.⁵²
- (87) Furthermore, the Notifying Party submits that from the customer's perspective, HDDs are also substitutable across form factors, notably 3.5" and 2.5", which is in turn reflected by the increasing price convergence between the two types of drives over the last four years.⁵³ (See Figure 2 and Figure 3).

[Figures displaying the price evolution of respectively 2.5" and 3.5" non-Enterprise HDDs within the period 2006-2010]*⁵⁴⁵⁵

- (88) The Notifying Party concludes that the relevant product market comprises at least all types of HDDs irrespective of their form factor or end-use applications and that the SSD technology should be included as well. This is the case as according to the Notifying Party, SSDs provide the same functionality as

⁵² Form CO, p. 37.

⁵³ Industry Average Price Per Unit Non-Enterprise; 2006-2010 320 GB, 7200RPM, Form CO, p. 47.

⁵⁴ Confidential Seagate Annex 7 to the Form CO.

⁵⁵ Confidential Seagate Annex 7 to the Form CO.

HDDs with some enhanced performance features. For this reason, Seagate maintains that this storage technology competes against HDD technology today, and in the near future will become even more vigorously competitive and directly substitutable with HDDs.

The Commission's assessment

- (89) The Commission's second phase investigation did not confirm the existence of demand-side substitutability across all HDDs. This finding is based on the fact that the various end-use applications largely determine the technical features of HDDs (capacity, interface, rpm and form factor) which can only in very limited cases be substitutable with one another. Moreover, for a given end-use application (as in the case of Desktop PCs and CE systems), HDDs of different form factors (namely 3.5" and 2.5") are not currently substitutable from a customer's stand-point.

Technical characteristics related to specific end uses

- (90) Respondents to the market investigation unanimously indicated that the intended end use of an HDD dictates specific technical characteristics in terms of form factor, interface, (rpm), and reliability requirements. Therefore there are only limited possibilities to substitute HDDs across different end-use applications.⁵⁶ In particular, any change of the HDD's technical characteristics can impact the performance of the final product into which the HDD is incorporated. The HDD's technical characteristics are strictly determined by the end product requirements.⁵⁷
- (91) In Recitals (92) to (105), the respective technical characteristics of different types of HDDs used in different end-use applications are compared and their substitutability assessed.

3.5" Desktop HDDs v. 3.5" CE HDDs and 2.5" Mobile HDDs v. 2.5" CE HDDs

- (92) Although HDDs used for Desktop PCs and HDDs used for CE applications share substantial technical similarities such as the same interface and heads and media design, they have different hardware and pre-installed firmware which render them not substitutable from a customer's perspective.
- (93) In this respect, one large OEM explained that it generally uses for its CE applications Desktop drives which are however, modified, configured and tested to meet the specific needs of its DVR's applications.⁵⁸
- (94) More specifically, another CE OEM explained that CE HDDs have much better acoustics than that of Desktop or Mobile drives due to slower seek times. This

⁵⁶ Customers reply to the Commission's request for information of 22 June 2011, question 2.

⁵⁷ Customers reply to the Commission's request for information of 20 April 2011, questions 8.2, 8.3 and 8.4.

⁵⁸ Customers reply to the Commission's request for information of 22 June 2011, question 21.

is the case as customers require best in class acoustic performance due to the hi-fi entertainment experience and also for multi-room products that operate 24/7 in a bedroom environment.

- (95) Command completion times on a Desktop or Mobile drive are unlimited whereas in a CE application the drive is required to complete commands within a maximum time of 500 ms. If a longer command completion time is permitted, this can manifest itself in stalled picture playback and macro-blocking which is highly visible to users and would trigger increased broadcaster call centre volume and complaints.
- (96) In a Desktop or Mobile drive the POH (Power on Hours) profile is typically 8-10 hours per day drive, whereas CE drives are required to operate 24/7.⁵⁹
- (97) Also the size of the cache memory is different given that in a CE HDD the cache needs to be from 8-64 MB whereas in a Desktop PC this could be as low as 8 MB.⁶⁰
- (98) In addition, another respondent stressed that due to performance differences between CE HDDs on the one hand and Desktop and Mobile HDDs on the other (which have higher failure rates) the latter drives types are not viable substitutes to CE drives.⁶¹
- (99) This is the case as CE applications are more demanding than PC applications due to the different environments into which they are integrated, namely, DVR and set-top boxes as opposed to PCs (either Desktop or Mobile devices). As a consequence, HDDs used in CE applications are technically more advanced than HDDs used in Desktops and Notebooks.
- (100) In light of the above, the vast majority of CE OEMs indicated that not only have they never replaced CE drives with either 3.5" Desktop HDDs or 2.5" Mobile (depending on the form factor required) but also that they would not be willing to do so even if the price of the former drives were to permanently increase by 5 to 10%. One OEM reported one instance where a competitor supplied a Desktop drive instead of a CE drive which resulted in significant customer dissatisfaction.⁶²

2.5" Mobile HDDs v. 3.5" Desktop HDDs

- (101) By analogy, a large OEM explained that given their portable nature, Notebooks require HDDs which are more shock resistant and have lower power consumption than those which are incorporated in Desktop PCs intended to be used at a fixed location.⁶³ Those technical features are normally offered by 2.5"

⁵⁹ Customers reply to the Commission's request for information of 15 September, question 1.

⁶⁰ Customers reply to the Commission's request for information of 22 June 2011, question 21.

⁶¹ Customers reply to the Commission's request for information of 15 September 2011, question 3.

⁶² Customers reply to the Commission's request for information of 15 September 2011, question 3.

⁶³ Customers reply to the Commission's request for information of 22 June 2011, question 2.1.

HDDs which are engineered in a more sophisticated way as compared to 3.5" HDDs for Desktop systems, in order to satisfy the requirements of transportable devices, namely, the space constraint, shock tolerance and low power consumption. Moreover, in order to achieve the resistance requirements of HDDs employed in Notebooks, manufacturers use the more expensive glass substrates which have a certain rigidity and hardness that cannot be offered by aluminium substrates typically employed in 3.5" HDDs for Desktop PCs. Finally, 2.5" Mobile HDDs predominantly use lower speeds (5.4 Krpm as opposed to 7.2 Krpm in Desktop PCs), as otherwise, the system would suffer from over-heating. The lower rotation speed also leads to a reduction of noise, which is a further relevant feature of the Mobile segment. For all those reasons, 3.5" HDDs are not a viable substitute for 2.5" Mobile HDDs.

3.5" Desktop HDDs v. 3.5" Enterprise Business Critical HDDs

- (102) Furthermore, despite certain similarities between 3.5" HDDs for Desktop applications on the one hand and for Enterprise Business Critical systems on the other hand, those two drives can be clearly distinguished on the basis of their technical features and the different applications where they are incorporated. First, as explained above, Enterprise Business Critical HDDs employ higher quality class components compared to Desktop HDDs and have installed sensors that react to movement and heat which Desktop HDDs do not normally employ. Second, they are subjected to a much longer testing process under harsher testing conditions which contribute to increased production costs. Third, they have higher reliability as compared to Desktop HDDs given that Business Critical HDDs need to be run 24 hours a day and handle large amounts of data while being relatively error-free.⁶⁴
- (103) The differences between the technical features of the two types of drives are in turn dictated by the end-use applications where those HDDs are employed and the different customers groups which purchase those drives. On the one hand, Business Critical Enterprise HDDs are sold to large enterprises, governments and businesses which use them in data centres for a relatively long time-frame (more than 2 years) in a high usage environment. On the other hand, 3.5" Desktop HDDs are integrated into PCs sold to companies and consumers which do not need the enhanced performance offered by the Business Critical Enterprise drives, notably, as HDDs used in PCs do not work in conjunction with other drives within data centres and have a shorter life-span than drives used in Enterprise servers (for instance, PCs are generally renewed after a couple of years).⁶⁵

⁶⁴ Samsung reply to the Commission's request for information of 22 June 2011, question 14.

⁶⁵ Deposition of Mr Piligian, Director consumer and commercial portfolio management of HGST, released on 19 July 2011 in front of the Federal Trade Commission, pages 23-24.

Price differences between different HDDs with different end-uses

(104) The market investigation also revealed that another distinguishing factor of HDDs belonging to different end-use applications is their selling price as illustrated in Table 8.

End-use/from factor		ASP (USD)	USD/GB
Mobile		42.1	0.13
Enterprise Mission Critical	2.5"	112.9	0.54
	3.5"	161.3	0.44
CE	2.5"	43.5	0.21
	3.5"	38.1	0.09
Business Critical	3.5"	127	0.11
Desktop	3.5"	42.8	0.08

Table 8: Price of HDDs by end-use⁶⁶

(105) Those price differences therefore limit the demand-side substitutability further. For instance, although some respondents to the market investigation explained that it would be theoretically possible to use Enterprise Business Critical HDDs in Desktop applications due to certain technical similarities of the two types of drives, they unanimously indicated that such a switch would not be commercially viable. There is indeed a significant price gap (around 38%) between the two types of drives.⁶⁷ Consistent with the foregoing, a large OEM, underlined that the use of more expensive Enterprise Business Critical HDDs in a Desktop PC (with the exception of very high-end Desktop PCs) would render that Desktop PC non-competitive with the others Desktop PCs in terms of price.⁶⁸ Moreover other two large Desktop PCs OEMs, explained that not only the two drives are not substitutable for commercial reasons but also because the design of those drives types is different and in some cases also the interfaces (SATA for Desktop HDDs and eSATA for Business Critical HDDs).⁶⁹

⁶⁶ The numbers are based on the 2010 transaction data of WD, Seagate, HGST, and Samsung. So, Toshiba, even if present in a given segment, is not included in the numbers. Percentages represent percent shares in value terms.

⁶⁷ Customers reply to the Commission's request for information of 22 June 2011, question 18.

⁶⁸ Customers reply to the Commission's request for information of 22 June 2011, question 18.

⁶⁹ Customers reply to the Commission's request for information of 22 June 2011, question 19.

- (106) For all these reasons, all the respondents to the market investigation confirmed that before considering using Enterprise Business Critical HDDs in Desktop PCs the price of the former should significantly decrease by 30 to 50% and that they do not expect this to happen in the coming three years.⁷⁰
- (107) The two drives types are, therefore, not substitutable since Desktop HDDs do not achieve the high performance demanded by servers and Business Critical HDDs are too expensive to be used in Desktop PCs.
- (108) Those considerations on existing limits to demand-substitutability among HDDs employed in different end-uses applications have even greater relevance in the case of HDDs for Enterprise Mission Critical applications which require drives of extremely high reliability and capable of severe full-time workload at very high performance levels which in turn command higher prices as compared to the other HDDs.⁷¹ As a consequence, Enterprise Mission Critical HDDs display some technical characteristics which distinguish them from any other HDD employed in different applications. Moreover, another distinguishing feature of those types of HDDs is the greater familiarity of customers with the product as well as the brand recognition which does not play a significant role with respect to other types of HDDs.⁷² This is in particular the case as Enterprise Mission Critical HDDs are much more customized products within the customers' application servers as compared to any other HDDs types, therefore, they are less substitutable with other comparable drives manufactured by competing suppliers. Also the qualification process of Enterprise Mission Critical HDDs by OEMs distinguishes them from the other types of drives since it is longer (on average 3 to 6 months as opposed to 2-3 months for Desktop and Mobile HDDs, depending on the OEM concerned) and more thorough.⁷³ Furthermore, the manufacturing process is significantly different to that of the other types of HDDs.

⁷⁰ Customers reply to the Commission's request for information of 22 June 2011, question 19.

⁷¹ Customers reply to the Commission's request for information of 22 June 2011, question 5.

⁷² Customers reply to the Commission's request for information of 22 June 2011, question 22.

⁷³ Customers reply to the Commission's request for information of 22 June 2011, question 39.

Different industry dynamics/supply chain models between HDDs with different end-uses

- (109) Furthermore, one large OEM pointed out that HDDs employed in different end-use applications not only display technical differences but are also subject to different industry dynamics and different supply chain models.⁷⁴ [Confidential information on Seagate's sales organisation]*.⁷⁵
- (110) Also Samsung acknowledges that customers purchase HDDs primarily based on end-user application.⁷⁶
- (111) In this respect it is worth noting that also the Court of Justice of the European Union has held that the structure of supply and demand in certain instances is important in determining the relevant market and may cause identical products to fall into different markets.⁷⁷
- (112) From a demand side-perspective, HDDs employed in different end-use applications do not appear substitutable for each other.

Distinction by form factor

- (113) The market investigation did not confirm the Notifying Party's argument that regardless of the fact that certain form factors are mostly associated to specific end-uses (such as 3.5" HDDs to Desktop applications and 2.5" to Mobile systems), HDDs with different form factors are substitutable for each other from a customer perspective. Given that 3.5" HDDs cannot be technically substitute to 2.5" drives due to the space constraints arising from all the end-use applications using the smaller form factor, the following analysis will focus on the potential substitutability of drives using the bigger form factor with HDDs using the smaller one.
- (114) Starting with the assessment of the potential substitutability between 3.5" HDDs and 2.5" HDDs in Desktop applications, Table 9 clearly shows that in the last three years Desktop PCs have been using predominantly 3.5" HDDs instead of 2.5" HDDs which are only marginally present and therefore cannot currently be considered as substitute HDDs.
- (115) This is primarily the case as 2.5" HDDs are more expensive at the same capacity point than 3.5" HDDs due to the form factor restrictions and the additional engineering costs which the smaller form factor requires. As a consequence, given that most Desktop systems have no space constraint and do

⁷⁴ Customers reply to the Commission's request for information of 22 June 2011, question 36, ID 3776.

⁷⁵ [Deposition of Seagate executive to the Federal Trade Commission]*

⁷⁶ Samsung reply to the Commission's request for information of 22 June 2011, question 5.

⁷⁷ Case 322/81, *NV Nederlandsche Banden Industrie Michelin v. Commission of the European Communities* [1983] ECR 3461, [1985] I CMLR 282; Case C-333/94P, *Tetra Pak International SA v. Commission* [1996] ECR I-5951.

not require certain technical features achieved by 2.5" HDDs (e.g. shock resistance and low power consumption), it would not make commercial sense to use a smaller form factor drive for Desktop PCs instead of the traditional 3.5" HDDs. This consideration is also upheld by Samsung which explained that "generally a customer would not purchase 2.5" HDDs for Desktop applications since a 2.5" unit would cost more than a 3.5" unit of equivalent quality."⁷⁸

	2008	2009	2010
Desktop			
2.5"	2%	2%	3%
3.5"	98%	98%	97%

Source: IDC

Table 9: Proportion of 2.5" HDDs used in Desktop PCs⁷⁹

(116) The very limited use of 2.5" HDDs in the Desktop space relates, in fact, to a specific category of Desktop PCs, namely, "All in one PCs", which are Desktop computers that combine the monitor in the same case as the Central Processing Unit, and therefore have similar space constraints as Notebooks. However, "All in one PCs" are still niche products as compared to the traditional Desktop PCs which predominantly use 3.5" HDDs.

(117) This view appears to also be shared by a HDD manufacturer which indicated that the ratio of 2.5" HDDs used in Desktop PCs is expected to increase only slightly until 2014-2015.⁸⁰

(118) Even assuming that the use of 2.5" HDDs in the Desktop PCs will grow by 100% over the next three years as compared to the current level the percentage of those drives used in Desktop would still be modest (below 4%).⁸¹

(119) Those findings were also confirmed by respondents to the market investigations.⁸² Indeed, with the exception of one OEM, all main PC OEMs either do not produce any Desktop PC with 2.5" HDDs⁸³ or they use this drive only to a minor extent as compared to 3.5" HDDs employed in the same end-use application.⁸⁴ One PC OEM also explained that the switch from 3.5" to

⁷⁸ Samsung reply to the Commission's request for information of 22 June 2011, question 7.
⁷⁹ Seagate reply to the Commission's request for information of 29 August 2011, question 1.
⁸⁰ Confidential HDD supplier reply to the Commission's request for information of 14 June 2011, question 9.
⁸¹ The assumption considers the total volume of HDDs forecasted to be shipped in Desktop applications in 2015 by TrendFocus, i.e. 236 million units (see paragraph (1)(a)(47)).
⁸² Customer reply to the Commission's request for information of 22 June 2011, question 7.
⁸³ Customer reply to the Commission's request for information of 22 June 2011, question 16.
⁸⁴ Customer reply to the Commission's request for information of 22 June 2011, question 7.

2.5" in the desktop market/segment has been announced for many years but has not yet taken place due to the existing higher price of 2.5" HDDs compared to 3.5" HDDs and the use of 2.5" HDDs in Desktop applications is still experimental.⁸⁵

(120) Furthermore, the results of the first phase investigation did not confirm the Notifying Party's claim that OEMs would generally be willing to replace 3.5" HDDs with 2.5" in case of a price increase of 3.5" HDDs by 5 to 10%. For instance, while one OEM submitted that it would do so only with respect to drives with low capacity points and equivalent rotational speed (7200 rpm), two other OEMs of equivalent relevance did not share the same view.⁸⁶ Those customers, who would consider switching to 2.5" HDDs in their Desktop PCs, indicated that they would do so provided that the price of the two drives is almost the same and the capacity of the 2.5" HDD is adequate for the final end-use application.⁸⁷

(121) In addition, five main PC OEMs (including those customers which do not exclude the replacement of part of their purchases of 3.5" HDDs with 2.5" HDDs for certain Desktop PCs in the event of a price increase of 3.5" HDDs), indicated that they do not intend to increase their purchases of 2.5" HDDs for their Desktop applications over the next three years,⁸⁸ notably due to the higher cost of using 2.5" HDDs as well as their limited range of capacity points available in comparison to the 3.5" drives which make them less attractive for Desktop PCs.⁸⁹ In support of this argument, Samsung also indicated that it does not expect customers to purchase 2.5" HDDs for Desktop applications due to costs considerations.⁹⁰

(122) Table 10, Table 12 and Table 11 demonstrate that for HDDs with a respective storage capacity of 320 GB, 500 GB and 1 TB which account for the largest shares in HDD sales for Desktop applications, the current price gap between the two form factors is significant, particularly if a comparison is made between drives of equivalent rpm.

⁸⁵ Minutes of meeting of 15 June 2011.

⁸⁶ Customers reply to the Commission's request for information of 19 April 2011, question 14.

⁸⁷ Customers reply to the Commission's request for information of 19 April 2011, questions 8.2 and 8.3 and Customer reply to the Commission's request for information of 22 June 2011, question 8.3.

⁸⁸ Customers reply to the Commission's request for information of 22 June 2011, question 8.

⁸⁹ Customer reply to the Commission's request for information of 22 June 2011, question 9

⁹⁰ Samsung reply to the Commission's request for information of 22 June 2011, question 7.

320 GB capacity			
End-use	RPM	Average Sales Price (USD)	USD/GB
3.5" Desktop HDDs	5400	36.2	0.11
2.5" Mobile	5400	39.6	0.12
3.5" Desktop HDDs	7200	35.2	0.11
2.5" Mobile	7200	44.3	0.14

Table 10: average prices of the merging firms for 320 GB HDDs⁹¹

500 GB capacity			
End-use	RPM	Average Sales Price (USD)	USD/GB
3.5" Desktop HDDs	5400	39.2	0.08
2.5" Mobile	5400	49.7	0.1
3.5" Desktop HDDs	7200	38.1	0.08
2.5" Mobile	7200	58.5	0.12

Table 11: average prices of the merging firms for 500 GB HDDs⁹²

1TB capacity			
End-use	RPM	Average Sales Price (USD)	USD/GB
3.5" Desktop HDDs	5400	62.6	0.06
2.5" Mobile	5400	99	0.1
3.5" Desktop HDDs	7200	61.4	0.06

⁹¹ The numbers are based on the 2010 transaction data of WD, Seagate, HGST, and Samsung. So, Toshiba, even if present in a given segment, is not included in the numbers. Percentages represent percent shares in value terms for 320 GB capacity HDDs.

⁹² The numbers are based on the 2010 transaction data of WD, Seagate, HGST, and Samsung. So, Toshiba, even if present in a given segment, is not included in the numbers. Percentages represent percent shares in value terms for 500 GB capacity HDDs.

Table 12: average prices of the merging firms for 1 TB GB HDDs⁹³

(123) The analysis performed by the Commission appears consistent with those arguments, showing that despite the increasing price convergence between 3.5" HDDs and 2.5" HDDs which took place in the last years, those drives still display a significant price difference particularly at high capacity points, which dissuades customers from substituting the two drives types for each other. As a consequence they cannot be considered as substitutable.

(124) The Commission has produced graphs (See Figure 2) in order to verify whether the existence of price correlation between the two drives is proof of substitutability

(125) The graphs for the average capacity per drive show that (i) the average capacity per drive is much higher for 3.5" HDDs than for 2.5" HDDs, (ii) the difference is relatively stable with the average 3.5" HDDs capacity being about 80% higher than that for 2.5" HDDs. This further confirms the existence of differences as regards the technical features between typical 2.5" HDDs and 3.5" HDDs sold which also result in price difference between the two drives.

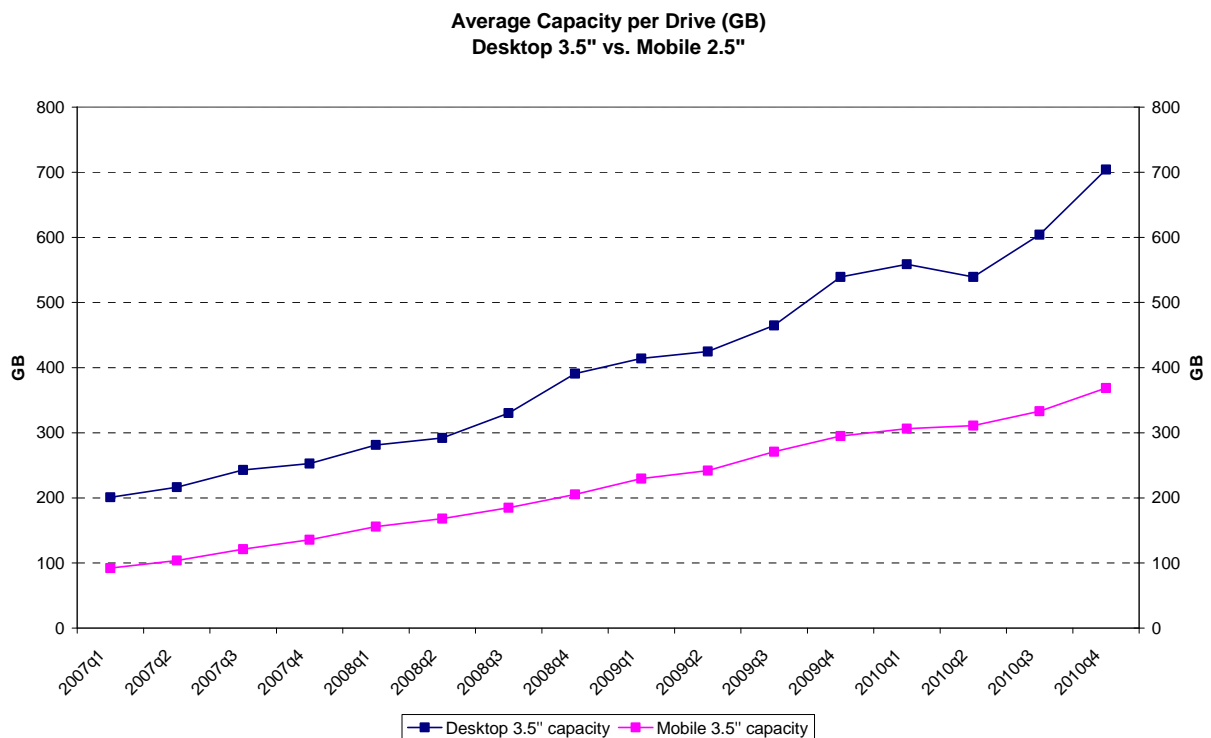


Figure 2: Evolution of average capacity per drive for 3.5" and 2.5" HDDs, 2000-2011⁹⁴

⁹³ The numbers are based on the 2010 transaction data of WD, Seagate, HGST, and Samsung. So, Toshiba, even if present in a given segment, is not included in the numbers. Percentages represent percent shares in value terms for 1TB capacity HDDs.

⁹⁴ The graph is based on the 2010 transaction data of WD, Seagate, HGST, and Samsung.

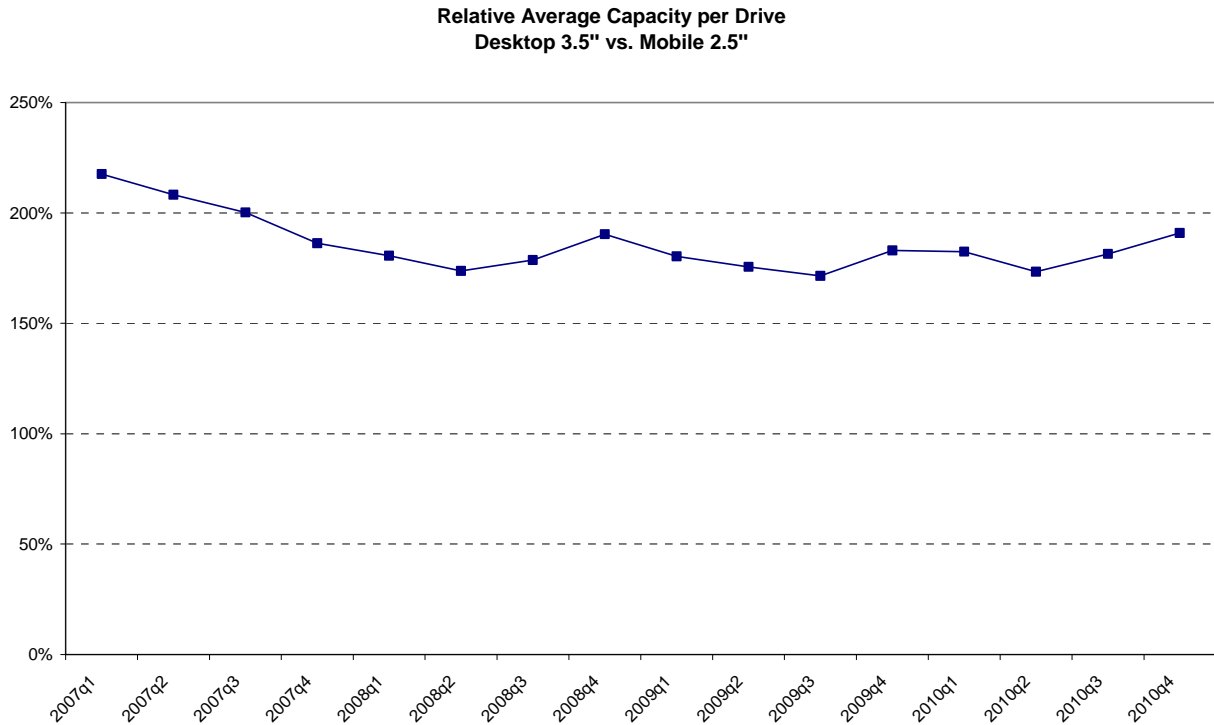


Figure 3: Evolution of relative capacity per drive for 2.5" vs. 3.5" HDDs, 2000-2011⁹⁵

(126) The market investigation also revealed that the price gap between the two types of drives is not expected to disappear over the next three years. Thus, although some customers anticipate a price convergence between 2.5" HDDs and 3.5" HDDs at some stage in the future, the vast majority of respondents is confident that the price difference between the two drives will instead remain in the immediate future, particularly at higher capacity points where such a price gap is larger (up to 40-50% price gap between the two HDDs).⁹⁶ One important PC OEM even suggested that the difference in price between 3.5" and 2.5" HDDs could even increase in the future, driven by consumer demand for high capacity Desktop PCs and that therefore it does not expect the Desktop industry to migrate to the smaller form factor.⁹⁷

(127) Furthermore, respondents to the market investigation unanimously indicated that the Desktop PC industry is migrating to the use of higher capacity points (from 500GB upwards).⁹⁸ Already some large OEMs do not use 3.5" HDDs with capacity lower than 500 GB in their PCs and others indicated that HDDs with lower capacity points (such as 160 GB and 250 GB) will soon be phased

⁹⁵ The graph is based on the 2010 transaction data of WD, Seagate, HGST, and Samsung.
⁹⁶ Customers reply to the Commission's request for information of 22 June 2011, question 13 and 13.
⁹⁷ Customers reply to the Commission's request for information of 22 June 2011, question 9
⁹⁸ Customers reply to the Commission's request for information of 8 September 2011, question 11.

out. Two HDDs suppliers also took the same stance in relation to the market's demand trends for the coming years.⁹⁹

(128) Both the Notifying Party and Samsung do not contest the existence of that tendency in the Desktop PC's industry mainly driven by consumers' demand for increasing storage space in their PCs.¹⁰⁰ The industry analyst IDC forecasts the same market trend.¹⁰¹

(129) It follows from the foregoing that, the more the Desktop PC industry migrates to higher capacity drives, the wider the price gap with the equivalent 2.5" HDDs and the longer it will take for that gap to close and to lead to a possible shift from 3.5" HDDs to 2.5" HDDs in Desktop PCs. Moreover, at higher capacity points (from 1 TB up), there are no corresponding 2.5" HDDs substitutes and OEMs either would not replace high capacity HDDs (above 500 GB) with lower capacity HDDs or the very few which would consider doing so (only for a small portion of their purchases) would definitely not switch to drives with storage capacity below 500 GB.¹⁰² As explained by two large OEMs, this is the case as any replacement of high capacity HDDs with lower capacity drives would reduce the attractiveness of the Desktop PCs for consumers and in the worst case lead to a decline of the end-products' sales.¹⁰³

(130) Based on Recitals (127) to (129), it can be concluded that also in a forward-looking perspective, the portion of the Desktop HDDs market that would be constrained by 2.5" HDDs' prices will increasingly decline thereby impairing any countervailing effect that any switch between the two drives might have against suppliers' attempt to raise prices of 3.5" HDDs drives.

(131) Moreover, a considerable number of respondents to the market investigation confirmed that in addition to the higher purchasing price of 2.5" HDDs as compared to the equivalent 3.5" HDDs, switching between HDDs with different form factors would require a certain amount of investment at system design level, a different assessment of the relative weight of cost/capacity in the end product and in many cases the agreement of the final customer.¹⁰⁴

(132) Additionally, any change to the technical specifications of a drive might impact the performance of the final product in which the HDD is incorporated. Almost all the respondents to the market investigation indicated that the use of 2.5" HDDs in Desktop applications in replacement of 3.5" HDDs would not improve the performance of Desktop PCs since at higher capacity points 3.5" HDDs perform better (for example, faster read and write data) and are more

⁹⁹ HDDs suppliers reply to the Commission's request for information of 9 September 2011, question 6.
¹⁰⁰ Seagate and Samsung respective reply to the Commission's request for information of 7 September 2011, question 4.
¹⁰¹ Samsung reply to the Commission's request for information of 7 September 2011, question 4.
¹⁰² Customers reply to the Commission's request for information of 8 September 2011, question 7.
¹⁰³ Customers reply to the Commission's request for information of 8 September 2011, question 7.
¹⁰⁴ Customers reply to Commission's request for information of 19 April 2011, question 8.3.

reliable. As pointed out by two important OEMs¹⁰⁵ the advantages achieved by 2.5" HDDs such as lower power consumption and better shock resistance are not critical for Desktop PCs therefore they would not be perceived as improving features by final customers.

(133) The vast majority of customers (including all Desktop manufacturers but one) confirmed that there will not be a major shift towards 2.5" HDDs within the Desktop PC industry in the following three years and that the use of 2.5" HDDs will continue to be limited to niche applications.¹⁰⁶ One large OEM reiterated in this regard that due to the cost and the capacity requirements, which are associated to Desktop applications, 3.5" HDDs will still be the preferred option¹⁰⁷, at least in the short term.

(134) In light of the above it is considered that 2.5" HDDs are currently not substitutable for 3.5" HDDs in Desktop PCs and are not expected to become substitutes at least in the next three years.

(135) Analogous conclusions regarding the existing obstacles to switch between 3.5" HDDs and 2.5" HDDs –namely the price difference between the two drives and the fact that 2.5" HDDs do not offer the complete range of capacity points as the 3.5" HDDs- appear are valid in relation to the CE market. In that market, both types of drives are used although end-use applications are different. Set-top boxes and DVR predominantly use 3.5" HDDs while game consoles use 2.5" HDDs.¹⁰⁸

Capacity (GB)	Price difference between 2.5" 5400 rpm HDDs and 3.5" 5400 rpm HDDs
160	4%
250	3%
320	15%
500	40%
640	47%
750	59%
1000	

¹⁰⁵ Customers reply to the Commission's request for information of 22 June 2011, question 11.

¹⁰⁶ Customers reply to the Commission's request for information of 22 June 2011, question 14.

¹⁰⁷ Customers reply to the Commission's request for information of 22 June 2011, question 16.

¹⁰⁸ Citi Group- Hard Disk Drives, at pp. 39-40.

Table 13: Price comparison between 3.5" and 2.5" CE HDDs in 2010 ¹⁰⁹

- (136) Respondents to the market investigation unanimously indicated that they would not replace 3.5" HDDs with 2.5" HDDs of equivalent capacity and rotational speed (which within the CE space is mainly of 5400 rpm) even if the prices of the former drives were to increase by 5 to 10%.¹¹⁰ This is the case as the price gap between the two drives types represents a significant barrier to shift to the smaller form factor for producers of DVRs and set top boxes given that HDDs represents the highest cost item in the manufacture of those products. Moreover, as explained by respondents to the market investigation, purchasers of DVRs and set-top boxes are extremely price sensitive, therefore, they would not be willing to pay more for the use of drives with the smaller form factor, regardless of the enhanced performance in terms of low power consumption.¹¹¹ In this respect, one CE OEM indicated that it has been tracking the price difference between 2.5" and 3.5" HDDs at the same capacity for the last two years and although it made its customers aware of the decreased cost gap between those drives types at least for those HDDs with low storage capacity (160 GB), the majority of its customers showed reluctance to pay any price premium even minimum (USD 0.50 for 2.5" 160 GB HDDs) to use drives with smaller form factor.¹¹²
- (137) Moreover, given that those end-use applications (DVRs and set-top boxes) require increasing storage capacity to store more media content inside those devices, 3.5" HDDs meet those storage requirements better than the 2.5" drives. A CE manufacturer explained that total storage capacity in video applications is the driving factor and that since media files will continue to grow in size, users will continue to store more and more content.¹¹³ It indicated that it does not therefore anticipate that the DVR industry will replace 3.5" HDDs with 2.5" HDDs because of the higher cost and limited storage capacity of 2.5 " HDDs.¹¹⁴ The manufacturer also pointed out that no supplier has so far been able to deliver a 2.5" drive which meets its requirements for DVRs at the same capacity and price point as 3.5" HDDs. It considers 3.5 HDDs as the most efficient and cost effective solution for non Mobile types applications.¹¹⁵
- (138) Another CE producer manufacturer explained that currently 2.5" HDDs cannot provide the very highest level of data storage capacity required by set-top boxes due to the reduced size of the smaller media. Moreover, it pointed out that the specific applications of this CE device set-top boxes necessitate the

¹⁰⁹ The numbers are based on the 2010 transaction data of WD, Seagate, HGST, and Samsung. So, Toshiba, even if present in a given segment, is not included in the numbers. Percentages represent percent shares in value term, aggregated over capacities.

¹¹⁰ Customers reply to the Commission's request for information of 22 June 2011, question 4.

¹¹¹ Customers reply to the Commission's request for information of 22 June 2011, question 6.

¹¹² Customers reply to the Commission's request for information of 22 June 2011, question 17.

¹¹³ Customers reply to the Commission's request for information of 22 June 2011, question 16.

¹¹⁴ Citi Group - Hard Disk Drives, p. 39.

¹¹⁵ Customers reply to the Commission's request for information of 22 June 2011, question 21.

performance of 3.5" HDDs. The manufacturer does not therefore expect to use 2.5" HDDs in its end-use applications over the next three years.¹¹⁶

(139) Another producer of set-top boxes indicated that it is not currently considering a replacement of 3.5" HDDs with 2.5" HDDs in its set-top boxes as such a switch would cause also high expenses to adapt the chassis, which hosts the drive, and the internal layout of its set-top boxes. The extra space that the use of the smaller form factor would create within the chassis is not needed in those specific devices.¹¹⁷

(140) Furthermore, by analogy with the Desktop PCs industry, also CE OEMs confirmed that the DVRs and set-top boxes industry is moving towards high storage capacity (above 500 GB) while the use of drives with lower capacity has been progressively abandoned. As acknowledged by CE OEMs, the main drivers moving manufacturers and their customers to higher storage capacity is the increasing addition of content in video applications (like DVRs and set-top boxes) as well as customers' demand for larger space to store their data.¹¹⁸ One CE OEM observed that the majority of its standard products will use 500 GB for the next three years whilst its higher-end, multi-room applications, will initially employ HDDs with 1 TB and may move to higher capacity.¹¹⁹ Another one indicated that its products will be using 3.5" 2 TB and 3 TB HDDs almost exclusively in the current and following year while one product only will use drives of 500 GB.¹²⁰ At those capacity points 2.5" drives are either too expensive or not available at all to be viable substitutes for 3.5" HDDs.

(141) In the Desktop market as well as in the CE market 3.5" HDDs are not currently significantly substitutable for 2.5" HDDs. For the CE market this concerns those end-use applications, notably, DVR and set-top boxes which currently employ HDDs with the bigger form factor. Furthermore, this situation is not expected to dramatically change in the next three years. This may also be inferred from the projected sales of 3.5" HDDs for CE applications for 2015, which will not decrease greatly as from their current level (47 million units in 2010 versus 46 million units in 2015).

5.2.1.2. Supply-side substitutability

The view of the Notifying Party

(142) The Notifying Party submits that the HDD industry is characterised by a high degree of supply-side substitution. In other words, HDDs suppliers are able to shift production between different types of HDDs without significant additional investments and in a short time frame. In this regard, the Notifying Party stresses that a producer already active in the production of one type of

¹¹⁶ Customers reply to the Commission's request for information of 22 June 2011, question 16.

¹¹⁷ Customers reply to the Commission's request for information of 22 June 2011, question 9.

¹¹⁸ Customers reply to the Commission's request for information of 8 September 2011, question 10.

¹¹⁹ Customers reply to the Commission's request for information of 8 September 2011, question 11.

¹²⁰ Ibidem.

HDD is generally able to switch production or expand into other types of HDDs due to common form factors or existing know-how relevant also to those other types, although, Seagate also admits that the relative ease with which HDD capacity can be redeployed depends on the production model of the particular drive producer.¹²¹

(143) [Confidential information on Seagate's production lines]*.¹²²

(144) [Confidential information on Seagate's production lines]*.

(145) In order to prove the alleged supply-side substitutability among different types of HDDs, the Notifying Party has reviewed its own product development costs and has produced estimates of the time and expense required for an existing HDD producer to commence supply of an HDD with different interface, rotational speed, form factor and capacity from HDDs that another HDD type already in production. According to Seagate estimates, it would take approximately [10-20]* months from engineering models to commercial shipping and delivery of a new HDD type in order to change interface when the HDD producer uses a third party's controller chip set (and develops the necessary code). This time frame would extend up to [20-30]* months were the HDD producer to develop the controller chip set and code itself. A similar period of time (up to [10-20]* months) would be required to change the HDD's rotational speed as well as to reduce a 3.5" drive to a 2.5" form factor.

(146) Notifying Party also observes that the incremental costs of the developments described in Recital (145) are not extremely high. Seagate claims that the investment required for the expansion of an existing product line into a new form factor would amount to approximately [several million USD]*. This cost would be even lower in the case of the expansion of an existing product line into a form factor already utilized by the supplier for other products. The change of an HDD interface would cost approximately [a few million USD]*, provided that the manufacturer already has the chip set, and up to [several million USD]* were the HDD producer to develop the chip set and code. Finally, an increase of rotational speed would cost between [several million USD]*.¹²³

(147) The Notifying Party maintains that the fact that certain HDDs suppliers are not present in all the HDDs market segments (for instance, Toshiba's lack of offer of 3.5" Desktop HDDs and Samsung lack of offer of Enterprise Mission Critical HDDs) is not an indication of the existence of separate markets rather the result of business strategy choices.¹²⁴ In this respect, Seagate also stresses that should a business opportunity arise post-merger, Toshiba, could easily reposition its product offering as to start selling 3.5" Desktop HDDs given the ease of supply-side substitution from its current 3.5" Enterprise offering, its technical expertise,

¹²¹ Form CO, p. 47.

¹²² Form CO, pp. 48 and 49.

¹²³ Form CO p. 48.

¹²⁴ Form CO, Paragraphs 49.

the legacy know-how acquired with Fujitsu (which used to manufacture drives for Desktop PCs) and the ability of OEMs to encourage such repositioning.¹²⁵

- (148) The Notifying Party concludes that due to the supply-side substitutability which characterises the HDD industry, the relevant product market should encompass at least all HDDs.

The Commission's assessment

- (149) The Commission analysed the degree of supply-side substitution across different types of HDDs in line with the criteria set out in the Commission Notice on the definition of relevant market for the purposes of Community competition law ("the Relevant Market Notice")¹²⁶ Firms are subject to three main sources of competitive constraints: demand side substitutability, supply side substitutability and potential competition. From an economic point of view, for the definition of relevant market, demand side substitution constitutes the most immediate and effective disciplinary force on the suppliers of a given product, in particular in relation to their pricing decisions.¹²⁷
- (150) Supply-side substitutability may be taken into account when defining markets in those situations in which its effects are equivalent to those of demand substitution in terms of effectiveness and immediacy.¹²⁸
- (151) This means that suppliers are able to switch production to the relevant products and market them in the short term (that is, such a period that does not entail a significant adjustment of existing tangible and intangible assets), without incurring significant additional costs or risks in response to small and permanent changes in relative prices. When these conditions are met, the additional production that is put on the market will have a disciplinary effect on the competitive behaviour of the companies involved. Such an impact in terms of effectiveness and immediacy is equivalent to the demand substitution effect.¹²⁹
- (152) When supply-side substitutability would entail the need to adjust significantly existing tangible and intangible assets, additional investments, strategic decisions

¹²⁵ Ibidem.

¹²⁶ OJ C 372, 9.12.1997, p. 5.

¹²⁷ Commission Notice on Market Definition, paragraph 13. As stated by the Court of First Instance in Case T-395/94 *Atlantic Container Line AB and Others v. Commission of the European Communities* [2003] ECR II-3275, paragraph 834, the Potential competition is not taken into account when defining markets since the conditions under which potential competition will actually represent an effective competitive constraint depend on the analysis of specific factors and circumstances related to the conditions of entry. If required, this analysis is only carried out at a later stage, in general once the position of companies involved in the relevant market has already been ascertained, and when such position gives rise to concerns from a competition point of view (Commission Notice on Market Definition, paragraph 24).

¹²⁸ Commission Notice on Market Definition, paragraph 20.

¹²⁹ Commission Notice on Market Definition, paragraph 20.

or time delays, it will not be considered at the stage of market definition, but, rather, at a later stage in the competitive assessment.¹³⁰

(153) On the basis of the characteristics of the market in this particular case, it may be considered that there exists a lack of immediate and effective supply-side substitutability between HDDs intended for different end-uses and within the same end-use application across form factors (3.5" and 2.5"). This is even more apparent in the case of Mission Critical Enterprise HDDs given the higher technical requirements involved in the production of such drives which are not common to the others. Therefore, there are insufficient grounds to conclude that despite the lack of demand-side substitution, the markets should be defined in a broader manner.¹³¹

(154) Furthermore, it may be concluded that there exists supply-side substitutability as regards HDDs having the same form factor which are within the same end-use category (such as 3.5" Desktop HDDs).

Lack of supply side substitution between 2.5" and 3.5" form factor HDDs

(155) The market investigation revealed that HDDs manufacturers do not regularly convert production lines from the production of HDDs with a given form factor to the production of HDDs with another form factor (for example from 3.5" to 2.5"). In this respect, Samsung itself acknowledges that its production model does not allow it to efficiently switch between different types of HDDs with different form factors as demonstrated by the fact that it has never done so in the last three years.¹³²

(156) This is in particular the case as each form factor utilizes a specific tooling design in the manufacturing process. As a consequence, most manufacturers including Samsung indicated that they have assembly lines dedicated to each form factor which allow it to increase the overall efficiency of the manufacturing process.¹³³

(157) One HDD producer pointed out the existence of barriers to switching between form factors (from 2.5" to 3.5") due to the difference in the physical size of the two drives types which affect the production machineries.¹³⁴

(158) It is doubtful whether most of the HDD suppliers would be able to timely convert their production lines to produce HDDs with different form factors as to satisfy the requirements of the test set out in paragraph 20 of the Relevant Market Notice in relation to supply-side substitution.

¹³⁰ Commission Notice on Market Definition, paragraph 23. Also as stated in paragraph 14 of the Commission Notice on Market Definition, the competitive constraints arising from supply side substitutability other than those described in paragraphs 20 to 23 of the said Notice and from potential competition are in general less immediate and in any case require an analysis of additional factors. As a result such constraints are taken into account in the assessment stage of the competition analysis.

¹³¹ Commission Notice on Market Definition, paragraph 14.

¹³² Samsung reply to the Commission's request for information of 22 June 2011, question 11.

¹³³ Samsung reply to the Commission's request for information of 22 June 2011, question 10.

¹³⁴ HDDs suppliers reply to the Commission's request for information of 20 April 2011, question 117.

- (159) Indeed, it resulted from the market investigation that any conversion of production lines across different form factors would entail time delays and substantial costs.
- (160) In 2009, Seagate which considers itself as a very flexible manufacturer, switched production lines from its 3.5" Desktop HDDs to its 2.5" Notebook HDDs for products already in high volume production within a time frame of approximately [0-10]* months for a cost of approximately [several hundred thousand USD]*.¹³⁵ Similarly, other HDDs manufacturers estimated conversion costs of existing production lines of magnitude of hundred thousands of USD.¹³⁶ In addition, opportunity costs of the conversion would have to be factored in.
- (161) Moreover, since HDDs which are not already in production would require critical mass and quality before being competitive, a further time delay of 3 to 6 months would have to be incurred in order to ramp up production after the conversion of an existing production line.¹³⁷ Adding OEM qualification (between 3 and 6 months depending on the type of the drive concerned) to the conversion process brings the overall leading time to at least 1 year.
- (162) Any switch across form factors would, therefore not be immediate and it would require significant adjustments to tangible and intangible assets. Moreover, considering the specific circumstances of the present case where Toshiba is not active in 3.5" HDDs (except for 3.5" Business Critical HDDs), an assessment has to be made whether Toshiba would be able to switch between 3.5" Business Critical HDDs and 2.5" Mobile and/or 2.5" CE HDDs and vice-versa immediately and effectively as to defeat any price increase by the merged entity post-merger.
- (163) Toshiba has pointed out that while key technologies such as heads and media do not differ significantly, any switch between drives with a different form factor would not be easy since drives with different form factors require a specific design and mechanical architecture.¹³⁸
- (164) Even if Toshiba were to convert its 3.5" Enterprise Business Critical production lines in order to produce 2.5" Mobile HDDs and/or 2.5" CE HDDs it would have to order a conversion kit incurring an expense analogous to that sustained by Seagate carrying out its 2009 conversion.. This would also require a leading time of [0-10]* months. Moreover, in order for Toshiba to convert its 3.5" Business Critical HDDs for use in 2.5" Mobile or CE applications, it would have to carry out some adjustments to the Enterprise 3.5" Business Critical drives which would include, *inter alia*, switching off the existing firmware or developing a customized one for use in CE applications and lowering the rotational speed from 7200 rpm to 5900-5400 rpm. All those adjustments would likely require a significant investment consistent with the estimates provided by Seagate with

¹³⁵ Seagate reply to the Commission's request for information of 22 June 2011, question 11.

¹³⁶ HDDs suppliers reply to the Commission's request for information of 20 April 2011, question 13.

¹³⁷ HDDs suppliers reply to the Commission's request for information of 20 April 2011, question 89.

¹³⁸ Toshiba reply to the Commission's request for information of 20 April 2011, question 117.

respect to the costs associated with the development of new form factors (approximately [several million USD]*).¹³⁹

- (165) Moreover, even if Toshiba decided to convert all of its current production capacity of 3.5" Business Critical HDDs into 2.5" Mobile and/or 2.5" CE HDDs it would not be able to immediately and effectively gain a sufficient market presence since it currently has a negligible presence in relation to 3.5" Business Critical HDDs which would be even smaller in relation to each of 2.5" CE and 2.5" Mobile HDDs, given that the total volume of Business Critical HDDsales for 2010 represent 57% of the 2.5" CE total volumes and 8.4% of the 2.5" Mobile total volumes.
- (166) It follows from the foregoing that in order to exercise an effective disciplinary force over its competitors in each respective market, namely, 2.5" Mobile HDDs and 2.5" CE HDDs, Toshiba would have to significantly invest in additional production capacity. Such an increase in production capacity would take on average 4 to 6 months.¹⁴⁰ In addition, as already explained in Recital 146, OEMqualification would also require additional months which would therefore extend further the lead time between the decision to convert a production line and the shipment of HDDs to OEMs.
- (167) In any event, regardless of the lead time and significant costs associated with the conversion of production lines across form factors, Toshiba would not have any economic incentive to sacrifice all of its production capacity of 3.5" Business Critical HDDs in order to manufacture drives which are already in high volume production, namely, 2.5" Mobile HDDs and 2.5" CE HDDs as it would rather make more commercial sense for Toshiba to invest in new production capacity consistent with its current behaviour.
- (168) It follows from the foregoing that any switch between 3.5" Enterprise Business Critical HDDs to 2.5" Mobile HDDs and/or 2.5" CE would lack immediacy and effectiveness as required by the Relevant Market Notice
- (169) The same may be concluded in relation to a potential switch from 2.5" Mobile and/or CE HDDs to 3.5" Business Critical HDDs. Indeed, such conversion would entail significant adjustments to the production process and lead time of several months in order to meet the heightened reliability requirements of 3.5" Business Critical HDDs and to carry out the longer testing procedure in comparison to either 2.5" CE HDDs or 2.5" Mobile HDDs. Moreover, it results from the business strategy of Toshiba that the conversion does not appear to be commercially rational as proven by the fact that in 2010 Toshiba decided to develop a new production platform to manufacture 3.5" Business Critical HDDs instead of converting its existing product lines of 2.5" HDDs.

¹³⁹ Form CO, page 48.

¹⁴⁰ HDDs suppliers reply to the Commission's request for information of 20 April 2011, question 89.

(170) On this basis, it may be concluded that there exists a lack of immediate and effective supply-side substitution between drives of different form factors.

Lack of supply side substitution between different end-use categories within the same form factor

3.5" Business Critical to 3.5" Desktop and vice-versa

(171) As explained in Recitals 85-86, although from a technical point of view, 3.5" Business Critical HDDs have some commonalities with 3.5" Desktop HDDs, there are also major differences between those two types of HDDs. 3.5" Business Critical HDDs and 3.5" Desktop HDDs operate in very different conditions. The prolonged hours/year, GB/day and higher operating temperatures which 3.5" Business Critical HDDs operate under result in an increased operating stress and reliability challenges.

(172) Better reliability is achieved in several ways. Reliability challenges are offset for 3.5" Business Critical HDDs through the use of certain different components in comparison to 3.5" Desktop HDDs. For example, the use of enhanced design margin/capability across the critical magnetic subsystem elements (heads, media, electronics) and the mechanical subsystem achieve an enhanced reliability. Faster random access times required for Business Critical drives as well as the vibration of the fans required to keep these drives from overheating increase vibration, which in turn makes it more difficult for the drive and adjacent drives to remain on their respective track. To address this problem, vibration sensors are installed on their PCBA and better head/media signal to noise ratio. The sensors are lacking from Desktop HDDs. Furthermore, the reliability and performance expected by customers of 3.5" Business Critical HDDs requires HDD manufacturers to subject the said HDDs to more extensive pre-release and manufacturing testing in comparison to 3.5" Desktop HDDs, which are tested for a shorter period of times and have significantly lower thresholds for passing tests, due to reduced specifications.¹⁴¹

(173) Business Critical HDDs require greater firmware features/unique customer features which are not required by standard Desktop HDDs and that by consequence increases their development time in comparison to 3.5" Desktop HDDs.

(174) Furthermore, although 3.5" Desktop HDDs only use the SATA interface, 3.5" Business Critical HDDs may be produced using the SATA or SAS interface. The SAS interface is more complex and supports higher performance. Toshiba's 3.5" Business Critical line offering covers both types of interface.

(175) As explained, 3.5" Business Critical drives require higher quality components (such as higher quality heads) and a more thorough test process than 3.5" Desktop HDDs. The technological complexities associated with creating superior 3.5"

¹⁴¹ Seagate reply to the Commission's request for information of 22 June 2011, question 14 and Samsung reply to the Commission's request for information of 22 June 2011, question 14.

Business Critical HDD translate into higher production costs in comparison to a 3.5" Desktop HDD. It is important to note that the technological complexities associated with creating the superior 3.5" Business Critical HDD translate into a significant price premium of 3.5" Business Critical HDDs over 3.5" Desktop HDDs particularly of Seagate's Business Critical drives which are designed on the basis of the more expensive Enterprise Mission Critical HDDs with some features and functionality removed.¹⁴² The price of Business Critical HDDs amount on average to 0.11 USD/GB versus 0.08 USD/GB of Desktop HDDs. The average selling price of a 3.5" Business Critical HDD is, at USD 127, significantly higher than the average selling price of USD 42.8 for a 3.5" Desktop HDD.¹⁴³

(176) Whilst WD, HGST, Seagate, Samsung and Toshiba are all active in 3.5" Business Critical HDDs, only Seagate, Samsung WD and HGST are currently active in 3.5" Desktop HDDs. Toshiba is not active in 3.5" Desktop HDDs. It only recently entered the 3.5" Business Critical HDD market, having announced its offering in December 2010.

(177) Seagate's production lines are dedicated to the HDD type being produced at any one time, but certain portions could be shared among the different HDDs being produced.¹⁴⁴ Samsung¹⁴⁵ produces its 3.5" Business Critical HDDs on dedicated production lines for efficiency purposes. Samsung explained in this respect that a production line for Business Critical HDDs usually takes longer to manufacture a product due to the increased number of tests involved to ensure higher product quality and also due to the more expensive components used in the production line.¹⁴⁶ Toshiba produces its 3.5" Business Critical HDDs on dedicated production lines.¹⁴⁷

(178) Given that the exercise of market definition consists in identifying the effective alternative sources of supply for the customers of undertakings involved,¹⁴⁸ and given that Seagate, Samsung, WD and HGST are already currently active in both 3.5" Business Critical HDDs and 3.5" Desktop HDDs, an analysis should in particular be made as to whether the HDD supplier, Toshiba, which does not sell 3.5" Desktop HDDs and commenced activities in 3.5" Business Critical HDDs in December 2010 could switch production to 3.5" Desktop HDDs and market them in the short term (that is, such a period that does not entail a significant adjustment of existing tangible and intangible assets), without incurring significant additional costs or risks in response to small and permanent changes in relative prices in order to significantly constrain 3.5" Desktop HDD suppliers.¹⁴⁹

¹⁴² Seagate reply to the Commission's request for information of 22 June 2011, question 14.

¹⁴³ See table 10.

¹⁴⁴ Seagate reply to the Commission's request for information of 22 June 2011, question 10.

¹⁴⁵ Samsung reply to the Commission's request for information of 22 June 2011, question 10.

¹⁴⁶ Samsung reply to the Commission's request for information of 22 June 2011, question 10.

¹⁴⁷ Toshiba reply to the Commission's request for information of 14 June 2011, question 15.

¹⁴⁸ Commission Notice on market definition, paragraph 13.

¹⁴⁹ Commission Notice on market definition, paragraph 20.

- (179) Toshiba has confirmed the Notifying Party's claim that it has the technical ability to 'dress-down' its 3.5" Business Critical HDD to offer multi-platter 3.5" Desktop HDDs.¹⁵⁰ However, the strategic decision to optimise its 3.5" Business Critical HDDs for use in 3.5" Desktop would entail a number of adjustments. These adjustments include the following, : switching off existing firmware, relaxing of tight performance specifications, switching the spindle motor of the HDD from a fixed motor to a rotating shaft which would include engineering changes to the product design, PCBA changes such as removal of vibration and/or altitude sensors on the PCBA fewer back-end test processes which require significant investments.¹⁵¹
- (180) In addition to the changes in the production lines to convert 3.5" Business Critical HDDs into competitive 3.5" Desktop HDDs, Toshiba pointed out that it would need to change the design architecture of its Business Critical drives in order to covert them into 3.5" Desktop HDDs. The all conversion process would therefore require significant strategic investments and a lead time of more than one but less than two and a half years..¹⁵²
- (181) Samsung also acknowledges that transforming a Business Critical Enterprise production line into a non-Business Critical Enterprise production line or vice versa would involve unnecessary costs that "*would need to be expended had dedicated production lines existed in the first place*".¹⁵³
- (182) Even with a 'dressed-down' version of its 3.5" Business Critical HDDs, Toshiba would only be present in a small portion of 3.5" Desktop HDDs market. Like other suppliers of Business Critical HDDs, Toshiba's 3.5" Business Critical HDDs are offered at higher capacity points in comparison to 3.5" Desktop HDDs (normally ranging from 250 GB to 2TB). In order, therefore, to have a complete portfolio of Desktop HDDs to effectively compete with the other suppliers of Desktop HDDs, Toshiba would have to develop drives with capacity points lower than 1 TB, particularly for use in corporate Desktop PCs.
- (183) Furthermore, in 2010, the market of 3.5" Business Critical HDDs was 13 times smaller than the 3.5" Desktop HDDs market in terms of volume. As a consequence, even if Toshiba were to fully convert its 3.5" Business Critical HDD production line to produce 3.5" Desktop HDDs, its market share (which is already negligible with respect to sales of 3.5" Business Critical HDDs) would be very low in the much larger 3.5" Desktop HDDs market.
- (184) In order, therefore, to exercise an effective disciplinary force on the suppliers of 3.5" Desktop HDDs, Toshiba would have to engage in significant additional investments in order to increase its capacity which in turn would require a lead time between 3 and 6 months.

¹⁵⁰ Toshiba reply to the Commission's request for information of 7 September 2011, question 15.

¹⁵¹ Toshiba reply to the Commission's request for information of 7 September 2011, question 11.

¹⁵² Toshiba reply to the Commission's request for information of 7 September 2011, question 11.

¹⁵³ Samsung reply to the Commission's request for information of 23 June 2011, Question 10.

- (185) The costs required to convert production lines, invest in new capacity, the loss of the higher margins for 3.5" Business Critical HDDs and the potentially unprofitable strategy of switching from 3.5" Business Critical HDDs to 3.5" Desktop, imply that although technologically feasible, such a switch would not be commercially feasible for Toshiba. In any event, the switch would require significant adjustments to tangible and intangible assets and a relative strategic decision by Toshiba.
- (186) Besides entailing additional costs, the strategic decision to increase capacity would also entail substantial time delays to be fully and effectively implemented. Additionally, a further lead time would be required for the 3.5" Desktop HDDs to be effectively marketed and qualified by OEMs. In addition, opportunity costs of the conversion would have to be factored in.
- (187) It may be concluded that there exists a lack of immediate and effective supply-side substitution from 3.5" Business Critical HDDs to 3.5" Desktop HDDs. Indeed, as explained in Recitals (179) to (186), Toshiba would not, in response to small and permanent changes in relative prices, be able to switch production from 3.5" Business Critical HDDs to 3.5" Desktop HDDs and market the latter in the short term, without incurring significant additional costs or risks. Given that the impact, in terms of effectiveness and immediacy, of supply-side substitution by Toshiba is not equivalent to the demand substitution effect,¹⁵⁴ there are insufficient grounds to conclude that the markets should be defined in a broader manner.¹⁵⁵
- (188) As regards a hypothetical¹⁵⁶ switching from 3.5" Desktop HDDs to 3.5" Business Critical HDDs, even if it were economically feasible because of higher margins in relation to 3.5" Business Critical HDDs, such a switch would entail the cost of redirecting production lines from 3.5" Desktop to 3.5" Business Critical HDDs (or indeed establishing separate production lines).
- (189) As explained in detail in the previous Recitals (172) to (174), 3.5" Business Critical HDDs, utilise higher quality components and entail longer testing procedures in comparison to 3.5" Desktop HDDs. Furthermore, 3.5" Business Critical HDDs are more customized than 3.5" Desktop HDDs and display heightened reliability requirements in comparison to 3.5" Desktop HDDs. For these reasons, HDDs suppliers already present in 3.5" Business Critical HDDs may be considered to possess a reputational advantage when compared to suppliers who are not present in 3.5" Business Critical HDDs.
- (190) For example, it took Toshiba a substantial amount of time to develop its 3.5" Business Critical HDDs. Furthermore, although it announced its 3.5" Business Critical offering in December 2010, with volume production scheduled to start for

¹⁵⁴ Commission Notice on market definition, paragraph 20.

¹⁵⁵ Commission Notice on Market Definition, paragraph 14.

¹⁵⁶ Currently each of WD, HGST and Seagate/Samsung have 3.5" Desktop HDD activities.

the first quarter of 2011,¹⁵⁷ Toshiba started volume production later in the 2nd quarter of 2011 and has yet to achieve significant sales and therefore, significant scale.¹⁵⁸ Therefore, regardless of costs of adjustments to tangible assets, an effective switch from 3.5" Desktop to 3.5" Business Critical HDDs is not likely to be immediate.

(191) It may therefore be concluded that there exists a lack of immediate and effective supply-side substitution from 3.5" Desktop to 3.5" Business Critical HDDs.

3.5" Business Critical to 3.5" CE and vice-versa

(192) HDDs used in CE products are subject to (i) higher usage (power-on-hours/year, read/write GB/day), (ii) higher operating temperature environment, and (iii) higher security features of the compressed, copyrighted, multimedia content they store. As a consequence, HDDs for CE applications are provided with specific firmware codes installed according to the application purpose. The firmware codes carry out certain functions for CE products such as going to "idle mode" to better perform sequential data reading, which is a method of uni-tasking data reading. These features are of the essence for DVRs, PVRs and surveillance cameras in which these types of HDDs are utilised.¹⁵⁹ In contrast, Desktop and Mobile HDDs are better equipped to handle multi-tasking.

(193) 3.5" Business Critical and 3.5" CE HDDs therefore share certain similarities. However, the reliability and operating challenges posed by 3.5" Business Critical applications are in general higher than those posed by 3.5" CE applications.

(194) The technological complexities associated with creating the superior 3.5" Business Critical HDD translate into a significant price premium of 3.5" Business Critical HDDs over 3.5" CE HDDs. The price of 3.5" Business Critical HDDs amounts on average to 0.11 USD/GB while the price of 3.5" CE HDDs to 0.09 USD/GB. The average selling price of a 3.5" Business Critical HDD is, at USD 127, significantly higher than the average selling price of USD 38.1 for a 3.5" CE HDD.¹⁶⁰

(195) WD, HGST, Seagate, Samsung and Toshiba are all active in the 3.5" Business Critical HDD market. Toshiba only recently entered the 3.5" Business Critical HDD market in December 2010 (Only Seagate, Samsung WD and HGST are currently active in the 3.5" CE HDD Market).

(196) As already explained in Recital 162, Seagate's production lines are dedicated to the HDD type being produced at any one time, but certain portions could be

¹⁵⁷ See Toshiba press release of 13 December 2010, http://storage.toshiba.com/techdocs/MKxxx1GRZB_Release.pdf (accessed on 10 October 2011).

¹⁵⁸ Customers reply to the Commission's request for information of 8 September 2011, question 2.

¹⁵⁹ Samsung reply to the Commission's request for information of 23 June 2011, questions 2 and 16.

¹⁶⁰ See table 10.

shared among the different HDDs being produced.¹⁶¹ Samsung¹⁶² produced its 3.5" Business Critical HDDs on dedicated production lines for efficiency purposes. In this regard, Samsung explained that, a production line for Business Critical HDDs usually takes longer to manufacture a product due to the increased number of tests involved to ensure higher product quality and also due to the more expensive components used in the production line.¹⁶³ Toshiba produces its 3.5" Business Critical HDDs on dedicated production lines.¹⁶⁴

(197) Given that the exercise of market definition consists in identifying the effective alternative sources of supply for the customers of undertakings involved,¹⁶⁵ and given that, Seagate, Samsung, WD and HGST are all already currently active in both 3.5" Business Critical HDDs and 3.5" CE HDDs, an analysis should in particular be made as to whether the HDD supplier, Toshiba, which does not sell 3.5" CE HDDs and commenced activities in 3.5" Business Critical HDDs in December 2010 could switch production to 3.5" CE HDDs and market them in the short term (that is, such a period that does not entail a significant adjustment of existing tangible and intangible assets)¹⁶⁶, without incurring significant additional costs or risks in response to small and permanent changes in relative prices in order to significantly constrain 3.5" CE HDD suppliers.¹⁶⁷

(198) Toshiba currently produces 1 and 2 TB, 7200 rpm, 3.5", multi-platter Business Critical HDDs on both the SATA and SAS interface.¹⁶⁸ Whilst submitting that various attributes of CE HDDs are also common to Business Critical HDDs, design changes are required to obtain CE specific firmware. Moreover, the large majority of 3.5" CE HDDs are single platter HDDs. Toshiba currently does not produce any 3.5" single platter HDDs as its 3.5" Business Critical HDDs are multi-platter HDDs. Therefore, Toshiba would have to develop a single-platter design for 3.5" CE HDDs. Toshiba indicated that the required changes to convert its current 3.5" Business Critical HDDs into competitive 3.5" CE HDDs would generally be similar to those required to implement a conversion from Business Critical HDDs to Desktop HDDs.¹⁶⁹ It may, therefore, be inferred from this that the overall conversion process would require significant investments over a period of at least 1 year.

(199) Moreover, given that the total volume of sales of 3.5" Business Critical HDDs for 2010 represent 40% of the total volume of sales for 3.5" CE HDDs, new capacity would also be needed for a switch by a supplier from 3.5" Business Critical to 3.5" CE HDDs to be effective.. Therefore, in order to exercise an effective disciplinary force on suppliers of 3.5" CE HDDs, Toshiba would have to engage

¹⁶¹ Seagate reply to the Commission's request for information of 23 June 2011, question 10.

¹⁶² Samsung reply to the Commission's request for information of 23 June 2011, question 10.

¹⁶³ Samsung reply to the Commission's request for information of 23 June 2011, question 10.

¹⁶⁴ Toshiba reply to the Commission's request for information of 14 June 2011, question 15.

¹⁶⁵ Commission Notice on Market Definition, paragraph 13.

¹⁶⁶ Commission Notice on Market Definition, paragraph 20, footnote 4.

¹⁶⁷ Commission Notice on market definition, paragraph 20.

¹⁶⁸ Toshiba reply to the Commission's request for information of 14 June 2011, question 15.

¹⁶⁹ Toshiba reply to the Commission's request for information of 8 September 2011, question 17

in significant additional investments in order to increase its capacity which in turn add an extra 3 and 6 months to the lead time required to redirect production from 3.5" Business Critical HDDs to 3.5" CE.

- (200) Seagate estimates that the total costs for a non-3.5" CE HDD supplier to achieve a 10% market share in relation to 3.5 CE HDDs would be approximately USD [100-200]* million.¹⁷⁰ In addition, it estimates that the total time required from procurement of equipment to production release would be [6-12]* months¹⁷¹ with [0-5 weeks]* for OEM qualification.
- (201) As regards OEM qualification, it is apparent from the market investigation that a longer time would be required for OEM qualification of 3.5" CE drives. Indeed, 3.5" CE OEMs indicated that qualification of those drives types takes approximately 3 to 6 months depending on the customer concerned.¹⁷² As a consequence, taking into account the timeline for obtaining new capacity, OEM qualification and production ramp-up to achieve quality and scale, the Notifying Party's estimated time line to effectively start selling 3.5" CE HDDs would be further extended to 11 to 14 months.
- (202) It may therefore be concluded that there exists a lack of immediate and effective supply-side substitution of 3.5" Desktop HDDs for 3.5" CE HDDs. As explained in Recitals (118) to (201), Toshiba would not, in response to small and permanent changes in relative prices, be able to switch production from 3.5" Business Critical HDDs to 3.5" CE HDDs and market the latter in the short term, without incurring significant additional costs or risks. Given that the impact, in terms of effectiveness and immediacy, of supply-side substitution by Toshiba is not equivalent to the demand substitution effect,¹⁷³ there are insufficient grounds to conclude that the markets should be defined in a broader manner.¹⁷⁴
- (203) As regards a hypothetical¹⁷⁵ switching from 3.5" CE to 3.5" Business Critical HDDs, even if it were economically feasible because of higher margins in relation to 3.5" Business Critical HDDs, such a switch would entail the cost of redirecting production lines from 3.5" CE to 3.5" Business Critical HDDs or indeed establishing separate production lines, as well as longer testing procedures in comparison with 3.5" CE HDDs. Furthermore, the heightened reliability requirements of Business Critical HDDs and greater customisation of those HDDs entails a closer interaction between the HDD supplier and customer for 3.5" Business Critical HDDs in comparison with 3.5" Desktop HDDs. HDD suppliers already present in 3.5" Business Critical HDDs may be seen as having a reputational advantage when compared to suppliers who are not present in 3.5" Business Critical HDDs.

¹⁷⁰ Seagate reply to the Commission's request for information of 7 September 2011, question 10.

¹⁷¹ Seagate reply to the Commission's request for information of 7 September 2011, question 10.

¹⁷² Customers' reply to the Commission's request for information of 22 June 2011, question 37 and 39.

¹⁷³ Commission Notice on market definition, paragraph 20.

¹⁷⁴ Commission Notice on Market Definition, paragraph 14.

¹⁷⁵ Currently all HDD suppliers have 3.5" Desktop HDD activities.

(204) It took Toshiba, for example, over one year to develop its 3.5" Business Critical HDDs. Furthermore, although it announced its 3.5" Business Critical offering in December 2010, Toshiba is still currently in the process of marketing those drives without achieving significant sales and therefore, significant scale. Indeed, only 3 out of the 11 3.5" Business Critical customers which replied to the market investigation have qualified one or more of Toshiba's 3.5" Business Critical HDDs.¹⁷⁶ Therefore, regardless of costs of adjustments to tangible assets, an effective switch from 3.5" Desktop to 3.5" Business Critical HDDs is not likely to be immediate.

(205) It may therefore be concluded that there exists a lack of immediate and effective supply-side substitution from 3.5" CE to 3.5" Business Critical HDDs.

3.5" Desktop to 3.5" CE and vice-versa

(206) 3.5" CE HDDs are similar to Desktop HDDs in that they use the same interface (SATA) and the same media and heads design. However, as recognized by all HDDs suppliers, drives for CE applications require customized firmware codes according to the specific end-use application where the drives are to be incorporated and in some case tuning motors to a lower rpm and the reduction of power consumption. Often additional acoustic damper plates or other means of reducing acoustic noise are also used in CE drives. As explained in more detail by Samsung in reply to the Commission investigation, the firmware differences between Desktop and CE HDDs are dictated by the end product where those drives have to be incorporated. For instance, DVRs require a better sequential data reading while PCs Desktop demand drives which are able to handle multi-tasking.¹⁷⁷

(207) 3.5" CE HDDs are also more customized than 3.5" Desktop HDDs due to the presence of the mentioned firmware. As a consequence, any development of those customized features requires longer time than is the case with the standard 3.5" Desktop HDDs and in turn translates into a slightly higher selling price.¹⁷⁸

(208) In order to switch production from 3.5" Desktop HDDs to 3.5" CE HDDs a supplier should (i) develop a specific firmware coupled with hardware modifications to accommodate the requirements of the CE application, (ii) qualify the new drive code design, and (iii) modify and qualify the factory drive test process code scripts to support the testing of the additional features. To accommodate the different spin speed, a supplier may also need to change the air bearing surface (ABS) design of the read/write head, although some of the read/write head ABS design points are adequate to perform over a range of spin speeds used by CE applications (5400rpm - 5900rpm) and Desktop (5400rpm - 7200rpm).¹⁷⁹

¹⁷⁶ Customer reply to the Commission's request for information of 8 September 2011, question 2.

¹⁷⁷ Samsung reply to the Commission's request for information of 23 June 2011, question 16.

¹⁷⁸ Samsung reply to the Commission's request for information of 22 June 2011, question 2.

¹⁷⁹ Seagate reply to the Commission's request for information of 28 September 2011, question 1.

- (209) Such a process would likely take [...] * and entail a certain amount of investments, although not very high, in line with Seagate's estimates on the lead time associated with changes to specific HDDs features like changes in interface and form factor.¹⁸⁰ Moreover, even where the supplier already has the available capacity to start the production of the new drive type by converting existing capacity of 3.5" Desktop HDDs, OEM qualification time of the CE drives has to be added to the overall conversion time. In addition, opportunity costs of the conversion would have to be factored in.
- (210) The market investigation revealed that while the qualification of suppliers already active in the CE market can take between 3 and 6 months depending on the specific customers' requirements, the process can be much longer for the qualification of suppliers which are new to the production of this drive type. One large CE OEM, for example, indicated that its qualification process of a new entrant into the CE space would take approximately 3 years because of the field performance assessment by which OEMs verify the failure rates of those drives.¹⁸¹
- (211) Furthermore, besides the conversion and qualification time, additional time would also be required for 3.5" CE HDDs to be effectively marketed in order to gain credibility and to be sufficiently competitive with the other suppliers' drives. This would likely extend even further the lead time associated with a successful conversion of production capacity across those two HDD types to well beyond 6 months, depending on the supplier's ability to meet customers' requirements for product quality and reliability
- (212) It may, therefore, be concluded that there exists a lack of immediate and effective supply-side substitution from 3.5" Desktop HDDs to 3.5" CE HDDs.
- (213) The reverse hypothetical switching from 3.5" CE HDDs to 3.5" Desktop HDDs, would also entail adjustments to the production process of 3.5" CE HDDs which consist, *inter alia*, of switching off the existing customized firmware and tuning motors to a higher rpm (as Desktop PCs mainly use drives with 7200 rpm).
- (214) This conversion could be achieved quickly. An additional 4 to 6 months would be required to ramp-up production capacity to achieve sufficient scale, a key factor to remain competitive in a high volume market as the 3.5" Desktop HDD space and another 2 to 3 months would be needed for OEM qualification. Also in this case, it would be reasonable to believe that a new entrant would need some time to successfully market its new HDDs to gain customers' confidence. As a consequence, also in the scenario where a supplier decided to convert its production capacity from 3.5" CE HDDs to 3.5" Desktop HDDs, it would need at least 6 to 9 months before being competitive on that market since the volume of 3.5" CE HDDs sold is much smaller than the volume of 3.5" Desktop HDDs sold.

¹⁸⁰ Form CO page 48.

¹⁸¹ Customers' reply reply to the Commission's request for information of 22 June 2011, question 37 and 39.

(215) In light of the above it may be concluded that even if an HDD supplier could switch production between 3.5" Desktop HDDs and 3.5" CE HDDs and vice-versa without incurring high costs, the time required to do so and particularly to gain a meaningful market share could amount to one year. This time frame appears realistic given that also in the past when other HDDs companies decided to expand in neighbouring HDDs markets it took them at least a year before gaining a meaningful market share. Not least, Toshiba's entry into the 3.5" Business Critical HDDs market, regardless of the peculiar features of this market which might have affected the lead time associated with the development of this type of drives, is another example showing that any expansion of HDDs suppliers from one market to another requires investments and is not immediate.

(216) It is concluded that there exists a lack of immediate and effective supply-side substitution from 3.5" Desktop HDDs to 3.5" CE HDDs and vice-versa which is required by the Relevant Market Notice to consider two products as belonging to the same market.

2.5" Mobile to 2.5" CE and vice-versa

(217) 2.5" Mobile and 2.5" CE HDDs are very similar drives as they both use the same physical hardware although 2.5" HDDs have a specific firmware code developed on the basis of the features required by the CE applications. For example, 2.5" CE HDDs are generally used in game consoles offer a better performance in terms of sequential data reading than 2.5" Mobile HDDs.¹⁸² As a result of the enhanced performance associated with 2.5" CE HDDs, those drives have slightly higher selling prices compared to 2.5" Mobile HDDs.¹⁸³

(218) By analogy with the conversion from 3.5" Desktop HDDs to 3.5" CE HDDs, converting the 2.5" Mobile HDD production line into 2.5" CE HDD production line would require notably the development of firmware codes tailored to the specific CE application and the qualification of the factory drive test process code scripts to support the testing of the additional features. As mentioned in Recital (210), the adjustments of the 2.5" Mobile HDDs to meet the requirements of 2.5" CE drives would entail a lead time of a few months and limited investments. Moreover, as already explained in Recitals (192) to (194), additional marketing time of the newly manufactured 2.5" CE HDDs and a further 3 to 6 months for OEM qualification (and longer for drives of new entrants into the 2.5" CE space) should be considered in order for a supplier to exercise an effective disciplinary force on its competitors. The lead time associated with a successful conversion of production capacity across the two HDDs types concerned could, therefore, total one year, depending on the supplier's ability to meet customers' requirements for product quality and reliability

(219) It may therefore be concluded that there exists a lack of immediate and effective supply-side substitution from 2.5" Mobile HDDs to 2.5" CE HDDs.

¹⁸² Samsung reply to the Commission's request for information of 22 June 2011, question 16.

¹⁸³ See table 10.

- (220) The reverse hypothetical switching from 2.5" CE HDDs to 2.5" Mobile HDDs, would also entail adjustments to the production process of 2.5" CE HDDs which consist, *inter alia*, of switching off the existing customized firmware, and changing heads, media and electronics as to adapt them to the standard 2.5" Mobile drives.
- (221) This conversion could be achieved quickly. Additional 4 to 6 months would be required to ramp-up production capacity to achieve sufficient scale which is a key factor in becoming competitive in a high volume market as the 2.5" Mobile HDDs space and another 2 to 3 months would be needed for OEM qualification. Also in this case, it would be reasonable to believe that a new entrant would need some time to successfully market its new HDDs to gain customers' confidence. Consequently, where a supplier decided to convert its production capacity from 2.5" CE HDDs to 2.5" Mobile HDDs, it would need at least 6 to 9 months before being competitive in this market since the volume of 2.5" CE HDDs sold is much smaller than the volume of 2.5" Mobile HDDs sold.
- (222) It may therefore be concluded that even if an HDD supplier could switch production between 2.5" Mobile HDDs and 2.5 CE HDDs and vice-versa without incurring high costs, the time required to do so and particularly to gain a meaningful market share could total one year. It follows from this that there exists a lack of immediate and effective supply-side substitution from 2.5" Mobile HDDs to 2.5" CE HDDs and vice-versa which is required in terms of the Relevant Market Notice to consider two products as belonging to the same market.

Mission Critical Enterprise

- (223) Mission Critical Enterprise HDDs are technically sophisticated and demand superior performance compared to the other types of HDDs. For instance, they offer an ability to read and write simultaneously, allow for higher usage levels and they are designed to operate in more demanding environments with lower failure rates.
- (224) The market investigation has confirmed that higher technical requirements are involved in the production of Mission Critical Enterprise HDDs compared to other types of HDDs. In particular, Mission Critical Enterprise HDDs require the use of customized interfaces (Fibre Channel or SAS interfaces), firmware and significant testing to ensure reliability and high performance. As a consequence, Enterprise Mission Critical HDDs are also distinguished from the other HDDs types in terms of their production.¹⁸⁴
- (225) It may, therefore, be concluded that there exists a lack of immediate and effective supply-side substitution between Mission Critical Enterprise HDDs and HDDs intended for other end-uses.

¹⁸⁴ HDDs suppliers reply reply to the Commission's request for information of 20 April 2011, question 9.

Supply side substitution between HDDs having the same form factor which are within the same end-use category

(226) The market investigation has indicated that for products within the same generation and architecture drive, HDD suppliers can vary technical characteristics of HDDs such as rotational speed and capacity within short time frames (immediately or within days) and without significant additional investments.¹⁸⁵ For products that are not currently in production, manufacturers indicated that they would be able to switch production to new product specifications (such as capacity) within a relatively short time-frame.¹⁸⁶ one HDD supplier explained that changing production from a Mobile drive to another Mobile drive with a higher capacity does not necessitate any switching costs and can be implemented in one day.¹⁸⁷

(227) It may, therefore, be concluded that there exists a sufficient degree of supply-side substitutability as regards HDDs having the same form factor which are within the same end-use category

Conclusion regarding supply-side substitution

(228) It may be concluded that there exists a lack of immediate and effective supply-side substitution between HDDs intended for different end-uses and within the same end-use application across form factors (3.5" and 2.5").

(229) In light of this, there are insufficient grounds to conclude that the HDDs markets should be defined in a broader manner than on the basis of a combination of form factor and end-use categories for HDDs.¹⁸⁸

5.2.1.3. The significance of competition from SSDs

The View of the Notifying Party

(230) The Notifying Party claims that SSDs are making increasingly significant inroads into market segments historically served by HDD suppliers and in some cases have even completely displaced HDDs for some brands of portable music players, digital cameras and smart phones which require smaller and shock resistant storage components. In the high-end enterprise, SSDs have already successfully displaced HDDs and Seagate anticipates SSDs moving down to less mission critical applications, as well as proliferating in the mobile and CE space. The Notifying party predicts that nearly [...] of commercial client units will move to SSD by [...]. It believes, however, that the rate of substitution between SSDs and HDDs is increasing rapidly. Seagate submits that although the demand for HDDs will remain strong, SSDs will continue to drive innovation and provide a

¹⁸⁵ HDDs suppliers reply to the Commission's request for information of 20 April 2011, question 13.

¹⁸⁶ Seagate and Samsung reply to the Commission's request for information of 24 June 2011, question 12.

¹⁸⁷ HDDs supplier reply to the Commission's request for information of 20 April 2011, question 13.

¹⁸⁸ Commission Notice on market definition, paragraph 14.

competitive alternative to HDDs since SSDs provide the same functionality as HDDs with some enhanced performance features.

- (231) Industry reports suggest that SSDs will become "*mainstream*" in the coming years, replacing HDDs in many applications. Some primary drivers for the switch to SSD are: (i) the price of NAND flash is decreasing, thus shrinking the price gap between SSD and HDD, (ii) the demand for faster access to data and applications is increasing, and (iii) the demand for capacity for local storage is decreasing. The last driver is especially important as storage is transferred away from local computing to cloud computing. Seagate believes that over a [...] period [...]*, the market will move from a client dominated market to a cloud based market.
- (232) Furthermore, the Notifying Party claims that although the price per GB for SSDs has historically been much higher than the price per GB for HDDs, there has been almost complete replacement of one inch and smaller form factor HDDs by SSDs. Similarly, 1.8 inch form factor sales have continued to decline as tablets utilizing embedded flash memory (primarily the iPad) have partly replace netbooks utilizing HDDs. The replacement of HDD for small form factors occurred despite the substantial historical difference in price per GB, suggesting that, on a quality adjusted basis, SSDs are less expensive than HDDs for small consumer electronics and many mobile devices.
- (233) Seagate considers that once the cost of SSDs falls below USD 30 for 64GB (which it anticipates will happen by [...]*), certain HDD customers will migrate heavily to SSD where capacity requirements are low.¹⁸⁹ In any event, the Notifying Party equally points out that although the anticipated increase demand of SSDs (noted in Seagate's business plan) is [...]* years away in the ordinary course of business, OEMs have the clear ability to accelerate their migration to SSDs if deemed necessary.¹⁹⁰
- (234) the Notifying Party, therefore, submits that whilst SSDs may not be directly substitutable for all HDDs today (notably, in end-use applications such as Desktop PCs requiring greater capacity), the threat represented by the future erosion of HDD sales by SSDs (coupled with the ability of OEMs to accelerate migration to alternative technologies if necessary) will constrain the activities on the merged entity post-merger. Therefore the disciplining force of SSDs on HDD pricing must be taken into account when examining the envisaged transaction.¹⁹¹

The Commission's assessment

- (235) The Commission investigation revealed that currently SSDs and HDDs are not sufficiently substitutable due to the significant price differential between the two technologies and the limited storage capacity of SSDs. Moreover, it does not appear that the situation will dramatically change in the short term, nor in those

¹⁸⁹ Form CO pp. 43-44.

¹⁹⁰ Seagate reply to the Commission's request for information of 22 June 2011, question 23.

¹⁹¹ Seagate comments of 13 June 2011 on the Article 6(1)(c) Decision of 30 May 2011, p. 16.

market segments, notably, Mobile and Mission Critical Enterprise space, which appear mostly affected by the rise of SSDs as an alternative storage technology to HDDs.

- (236) The Commission therefore concludes that SSDs and HDDs do not belong to the same relevant product markets identified in relation to HDDs.

The results of the market investigation

- (237) The HDD manufacturers which replied to the market investigation generally submitted that despite the significant price differential compared to HDDs, SSDs have increasingly penetrated into market segments historically dominated by HDDs, notably, (i) in very small form factor applications where low storage capacity is required, (that is, MP3 players, branded music devices which used to employ 1.8" HDDs), (ii) ultra-portable notebooks (such as MacBook Air) and (iii) high-end Mission Critical Enterprise applications.¹⁹² Particularly in the Mission Critical Enterprise segment, the sale of SSDs has largely grown in the last years because of their enhanced performance features as compared to HDDs (for example, SSDs have the ability to provide much higher inputs/outputs per second (IOPS) than HDDs and therefore can rapidly process large volumes of data).¹⁹³
- (238) Current SSD technology is not, however, equally suited to all end-use applications, particularly where high storage capacity is required as is the case for Desktop PCs, Business Critical applications and CE end-use applications such as set-top boxes and DVRs., one HDD supplier pointed out that it does not foresee SSDs displacing HDDs in CE and Enterprise Business Critical applications due to the high price gap between SSDs and HDDs at the same capacity points.¹⁹⁴ Similarly, Samsung (which produce both storage devices) indicated that it does not anticipate SSDs' growth to take place to the detriment of HDDs' sales in the near future due to the significant price differential between the two storage technologies which is expected to remain in the coming years. Samsung also explained that one of the main advantages of SSDs is their flexibility in size when installed into very small laptops., Traditional Notebook and Desktop PCs do not, however, have that stringent physical constraint and can therefore continue using traditional HDDs which achieve higher capacity for lower prices.¹⁹⁵
- (239) Moreover, the vast majority of the customers which replied to the market investigation supported the above arguments on the limited substitutability between the two storage devices. Thus, they pointed out that despite the superior features of SSDs which render them attractive in certain applications (such as in the Mission Critical Enterprise space)¹⁹⁶, the existing price/GB differential between HDDs and SSDs coupled with some reliability problems (for example,

¹⁹² HDDs suppliers reply to the Commission's request for information of 20 April 2011, question 17.

¹⁹³ HDDs supplier reply to the Commission's request for information of 20 April 2011, question 17.

¹⁹⁴ HDDs supplier reply to the Commission's request for information of 20 April 2011, question 27.

¹⁹⁵ Samsung reply to the Commission's request for information of 22 June 2011, question 18.

¹⁹⁶ Customers reply to the Commission's request for information of 22 June 2011, question 25.

SSDs appear more susceptible to data losses) strongly hamper the possibility to replace HDDs with SSDs.¹⁹⁷

Market Shares (Unit) By End Use and Sub-Categories

	End Use	Sub-Category	CY08	CY09	CY10	CY11	CY12	CY13
SSD	Consumer Electronics	Mobile CE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Consumer Electronics	Standard CE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Consumer Electronics	Business-Critical Enterprise	0.0%	0.0%				
	Desktop	Business-Critical Enterprise	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Desktop	Deskbased PC	0.0%	0.2%	0.2%	0.3%	0.8%	1.6%
	Mission-Critical Enterprise	Mission-Critical Enterprise	0.2%	1.1%	2.4%	3.5%	5.3%	7.9%
	Notebook	Business-Critical Enterprise	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Notebook	Deskbased PC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Notebook	Mobile PC	2.5%	2.2%	2.6%	3.2%	4.2%	5.4%
	Retail	Retail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
HDD	Consumer Electronics	Mobile CE	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Consumer Electronics	Standard CE	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Consumer Electronics	Business-Critical Enterprise	100.0%	100.0%				
	Desktop	Business-Critical Enterprise	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Desktop	Deskbased PC	100.0%	99.8%	99.8%	99.7%	99.2%	98.4%
	Mission-Critical Enterprise	Mission-Critical Enterprise	99.8%	98.9%	97.6%	96.5%	94.7%	92.1%
	Notebook	Business-Critical Enterprise	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Notebook	Deskbased PC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Notebook	Mobile PC	97.5%	97.8%	97.4%	96.8%	95.8%	94.6%
	Retail	Retail	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 1.5.IA Pivot Table - HDD Forecast by Segment.xls

(240)

The OEMs interviewed indicated that they currently make minimal use of SSDs (on average far below 5%) as compared to HDDs across all end-use applications, including in Notebook and Enterprise Mission Critical systems which are the most affected segments by SSD penetration.¹⁹⁸

¹⁹⁷ Customers reply to the Commission's request for information to customers of 19 April 2011, question 9.

¹⁹⁸ Customers reply to the Commission's request for information of 22 June 2011, question 23.

Table 14: Comparison of HDDs and SSDs employed in different end-use applications¹⁹⁹

- (241) Table 14 confirms that finding as it contains data that show t that, on the one hand, certain end-use applications do not employ SSDs at all and are not expected to do so in the near future (notably CE applications and Business Critical applications) and on the other hand, that even in those applications where SSDs have been adopted, namely, Enterprise Mission Critical HDDs and Notebook applications, they currently do not exert a significant constraint . In this regards, one important OEM which purchases Business Critical HDDs explained that due to increasing demand for high storage capacity in the Business Critical space (3 TB vs. 400-500 GB achieved by SSDs), it does not consider a shift of this market segment towards SSDs possible. In addition, this would not make commercial sense at the current price level of SSDs which are ten time more expensive than HDDs at 3 TB capacity point.²⁰⁰
- (242) Although few respondents indicated their intention to increase their purchases of SSDs in the coming years²⁰¹ following the expected price decrease of SSDs²⁰², they unanimously confirmed that they do not expect a large replacement of HDDs with SSDs in the next three years. Such replacement is unrealistic not only for costs reasons but also due to SSDs inadequacy to high write applications and its limited capacity as compared to HDDs.²⁰³
- (243) An important HDD customer indicated that the adoption of SSDs might be limited to a niche market (as in the case of ultra-light Notebooks) where customers might be willing to pay a price premium while customers in the mass market are not expected to pay any price premium, all the more so given that some superior features of the SSDs are not essential for those customers.²⁰⁴ This is in particular the case for the Desktop PC market where neither resistance nor low power consumption are the main requirements for those devices.
- (244) Additionally, the same customer underlined that currently HDDs can serve better than SSDs the various applications where the two technologies are potential competitors, including Desktop, Mobile and Mission Critical Enterprise applications.²⁰⁵ The same consideration appears valid in relation to the CE space as confirmed by the fact that none of the OEMs active in this market segment considers SSDs as a valid alternative to HDDs.²⁰⁶ Two CE producers explained that currently SSDs are unable to handle the frequencies with which a set-top box writes to the memory component. Also in this case as reiterated by many other

¹⁹⁹ Confidential Seagate Annex 17 to the Form CO.

²⁰⁰ Customers reply to the Commission's request for information of 22 June 2011, question 29.

²⁰¹ Customers reply to the Commission's request for information of 22 June 2011, question 24.

²⁰² Customers reply to the Commission's request for information of 22 June 2011, question 30.

²⁰³ Customers reply to the Commission's request for information of 22 June 2011, question 31.1.

²⁰⁴ Customers reply to the Commission's request for information of 22 June 2011, question 26.

²⁰⁵ Customers reply to the Commission's request for information of 22 June 2011, question 29.

²⁰⁶ Customers reply to the Commission's request for information of 22 June 2011, question 29.

respondents to the market investigation, the price disparities for comparable memory capacities in SSDs are too high to justify a replacement with HDDs.²⁰⁷

- (245) Respondents to the market investigation almost unanimously replied that they would not replace their purchases of HDDs with SSDs in case of a permanent price increase of HDDs by 5 to 10%, irrespective of the end-use application concerned. All manufacturers of Desktop and Notebook PCs, indicated that even if that price increase were to occur, the price differential with HDDs would still be considerable and the storage capacity would be too low to trigger any shift to SSD technology.²⁰⁸ Even a large user of SSDs replied that a price increase of HDDs would drive only a marginal increase of its purchases of SSDs.²⁰⁹
- (246) OEMs active in the Enterprise and CE space confirmed this view. For example, while one Mission Critical Enterprise customer indicated that it would potentially consider a transition to SSD only on high-performance Enterprise products²¹⁰, two other customers belonging to the same category did not express any intention to use SSD technology even in the event of a price increase of HDDs by 5 to 10%.²¹¹ One important CE customer, in turn, stressed that beyond the cost and capacity considerations, HDDs are significantly more reliable than SSDs, particularly in high write applications (as in the case of DVR and set top boxes) therefore they are currently not acceptable substitutes for HDDs for its products.²¹² This is also confirmed by industry analyst IDC which considers end-users concern about SSD reliability as a major obstacle to the adoption of SSDs.²¹³
- (247) Furthermore, although a few respondents confirmed that an increase in the price of HDDs might accelerate the adoption of SSDs for certain end-use applications, notably, high-end Notebook and Enterprise applications, the vast majority did not consider that this would trigger a substitution of HDDs by SSDs in the next three years due to the substantial price gap which is expected to remain within this time frame.²¹⁴ Moreover, according to IDC, recent supply constraints on NAND flash, which is the largest bill-of-material component for an SSD, have translated into slower price-per-GB erosion than forecasted. Therefore, it appears questionable that the price gap between SSDs and HDDs will close in the next three years as to significantly increase in the competitive constraint of SSDs over HDDs.
- (248) This contention does not seem disputed by the emergence of new technologies like cloud storage which according to the Notifying Party will further aid the growth of SSDs to the detriment of HDDs by lowering customers' requirement for storage capacity.

²⁰⁷ Customers reply to the Commission's request for information of 22 June 2011, question 29.

²⁰⁸ Customers reply to the Commission's request for information of 19 April 2011, questions 10.

²⁰⁹ Customers reply to the Commission's request for information of 19 April 2011, questions 10.

²¹⁰ Customers reply to the Commission's request for information of 19 April 2011, questions 11.

²¹¹ Customers reply to the Commission's request for information of 19 April 2011, questions 11.

²¹² Customers reply to the Commission's request for information of 19 April 2011, questions 13.

²¹³ Annex 3 submitted by Seagate on 29 June 2011.

²¹⁴ Customers reply to the Commission's request for information of 22 June 2011, question 32.

- (249) Respondents to the market investigation generally confirmed that the development of storage in the cloud might reduce demand for large storage capacity. However, some significant PC OEMs, equally pointed out that cloud computing will not affect the large consumer Desktop market in the next three years²¹⁵ and that the adoption of the cloud will be limited in the short term due to problems associated to data transfer speed and server quality as well as data protection concerns of the end-users.²¹⁶ One respondent even stressed that consumers' PCs will continue to require significant capacity as consumers prefer to store their personal data like pictures, movies etc, on their PCs.²¹⁷ Three other significant PC manufacturers shared this view.²¹⁸
- (250) With respect to the Enterprise space, customers took a similar view. One OEM submitted that despite the increased interest among enterprise customers in cloud-based information technology infrastructures, it is not sure that the adoption of this storage technology will lead to the reduction of demand for local storage, whether on Desktop or Notebook PCs or on local servers.²¹⁹
- (251) It is apparent from the market investigation that cloud-based services will not make significant inroads into the storage market before 5 to 10 years.²²⁰
- (252) At least within the time-frame considered for the assessment of the envisaged transaction, the introduction of cloud services will not have any relevant impact on the rate of utilisation of SSDs irrespective of the end-use application considered.
- (253) Analogous considerations are valid in relation to the risk that the future cannibalisation of consumer Notebooks' sales by Tablets' sales will favour the adoption of SSDs over HDDs. Thus, although some customers²²¹ believe that the growth of Tablets might negatively impact Desktop PCs sales in the future, other significant OEMs expressed the opposite view.²²² For example, one OEM indicated that its company experienced a stable growth on Desktop PCs in the past couple of quarters and that it does not expect a decrease in Desktop PC demand in the near future.²²³ Another significant OEM although recognizing that in recent years sales of Notebooks and tablets have increased at the expense of Desktop PCs, it still anticipates its sales of Desktop PCs to remain stable in developing countries where price is a more important factor.²²⁴
- (254) Furthermore, according to the analysis carried out by Citigroup, the risk of cannibalization of Laptops by Tablets is questionable at least in the near term and

²¹⁵ Customers reply to the Commission's request for information of 22 June 2011, question 70.1.
²¹⁶ Customers reply to the Commission's request for information of 22 June 2011, question 70.
²¹⁷ Customers reply to the Commission's request for information of 22 June 2011, question 70.
²¹⁸ Customers reply to the Commission's request for information of 22 June 2011, question 70.
²¹⁹ Customers reply to the Commission's request for information of 22 June 2011, question 70.1.
²²⁰ Customers reply to the Commission's request for information of 22 June 2011, question 69.2.
²²¹ Customers reply to the Commission's request for information of 22 June 2011, question 66.2.
²²² Customers reply to the Commission's request for information of 22 June 2011, question 66.2.
²²³ Customers reply to the Commission's request for information of 22 June 2011, question 66.
²²⁴ Customers reply to the Commission's request for information customers of 22 June 2011, question 66.

even considering a potential replacement of Notebooks with Tablets in the coming years, the Notebook market is still expected to expand, this in turn leading to the continuing growth of HDDs used in those Notebooks.²²⁵

(255) Even taking into account the impact of alternative technologies (cloud-based services) or consumer devices (such as Tablets) on sales of HDDs, it still appears that HDDs will remain the prevalent storage technology at least in the coming years.

Conclusion

(256) It may, therefore, be concluded that SSDs and HDDs are not currently substitutable due to the significant price differential between the two technologies and the limited storage capacity of SSDs compared to HDDs.

(257) Moreover, any potential future replacement of some types of HDDs with SSDs, notably in the Mission-Critical Enterprise space and the high-end Notebook market such as ultra-portable notebooks, is likely to occur only in the longer term.

(258) The competitive pressure currently exerted by SSDs on HDDs would appear to be too limited to impose any price constraint over HDDs suppliers and the current market conditions are not expected to dramatically change in the short term. It could, therefore, be relatively easy for HDDs suppliers to raise HDDs prices in the short term without risking reducing their sales in favour of SSDs. This is the case as the price of SSDs is currently 20 times higher than the price of HDDs, therefore even a price rise of HDDs by more than 50% would not trigger a significant shift towards SSDs.

(259) Given that respondents to the market investigation do not expect this price gap to close in the coming three years, it can be concluded that at least in the near future SSDs will not exert sufficient competitive pressure on HDDs to prevent HDDs suppliers from raising their price. Consequently, SSDs do not currently belong to the same relevant HDD product markets.

5.2.1.4. Conclusion on the relevant product markets (HDDs)

(260) It is apparent that from a demand-side perspective customers appear unable to substitute HDDs produced for certain end-uses with other drives displaying a different form factor or other technical features required by different end-use applications.

(261) From a supply-side perspective, the results of the market investigation could not establish sufficient supply-side substitutability in terms of effectiveness and immediacy to justify a broader market definition. In the current market conditions where not all of the HDDs manufacturers are offering the same types of HDDs

²²⁵ Citi Group- Hard Disk Drives, at pp. 11-13.

* Should read: [for HDDs].

due to Toshiba's lack of offer of 3.5" HDDs for Desktop and CE applications, it does not appear that Toshiba would be able to convert its production capacity to manufacture those types of drives immediately and without significant additional costs in line with the requirements for the existence of supply-side substitution. Moreover, there are indications that not all the HDD suppliers have the same flexibility to immediately switch production across all types of HDDs drives with a different form factor.

(262) The following relevant product markets [...] can be determined: (i) Mission Critical Enterprise HDDs²²⁶, (ii) 3.5" Business Critical HDDs, (iii) 3.5" Desktop HDDs, (iv) 3.5" CE HDDs, (v) 2.5" Mobile HDDs and (vi) 2.5" CE HDDs.

5.2.2. Relevant product markets (XHDDs)

(263) XHDDs allow PC users to supplement the storage space of their PC systems, their home and small office networks, or their CE devices. They provide stand-alone storage solutions. In addition, XHDDs are used as back up solutions to prevent the loss of files in case of system failure or file corruption in internal HDDs. XHDDs use HDDs as inputs that are then incorporated in a casing and built with the desired interface and power supply. The costs of HDDs represent [70-80]*% to [90-100]*% of the total production costs of an XHDD.²²⁷

(264) The vast majority of XHDDs are connected with their interface directly to the PC or CE system (Direct Attached Storage (DAS)) while some XHDDs can use Wi-Fi and other forms of network connection to transfer their contents to the PC or CE system (Network Attached Storage (NAS)).

(265) The most common interface used for XHDDs is currently the Universal Serial Bus (USB).²²⁸ For XHDDs to be used in connection with Apple computers, other interfaces such as eSata²²⁹, FireWire, Thunderbolt are also integrated into XHDDs. [...] ²³⁰ However, currently the DAS segment is by far the most common system. WD, for example, achieves 96% sales by value with DAS XHDDs. The rotational speed is generally between 5400 and 7200 rpm and the capacity currently between 250 GB and 3 TB.

(266) XHDDs are available in three form factors: 1.8", 2.5", or 3.5". The three models have different requirements and provide consumers with varying degrees of storage capabilities.

²²⁶ For the purpose of the present Decision there is no need to differentiate HDDs Mission Critical Enterprise HDDs according to the form factor as no competition concerns arise from this market under any alternative product market definition.

²²⁷ Customers reply to the Commission request for information of 20 April 2011, question 100. [...]*.

²²⁸ [...]*.

²²⁹ Interface for external applications with separate cables, connectors, and different electrical requirements than SATA.

²³⁰ [...]*.

- **1.8” drives:** By far the least popular of the three. In 2009, for example, approximately only 260,000 units of this size were sold.²³¹ Still, this market seems to appeals to a clientele that is in search of ultra-portability for mass storage.²³² Comparatively, consumers purchased 30.2 million units of the 2.5” and 24.5 million units of the 3.5” devices worldwide in 2009.²³³
- **2.5” drives:** Smaller and more easily transported. Furthermore, they are powered by the machine in which they are inputted. Going forward, analysts expect that the 2.5” model will gain further in popularity – as long as it maintains pace with end-user requirements – due to its price, portability, and USB connectivity.²³⁴
- **3.5” drives:** Directed towards users that require extreme storage capacities, and tend to be large and unwieldy. Additionally, due to their power usage, they require an external power source. This might change, however, with the introduction of new interfaces like USB 3 and Thunderbolt which are able to transfer a higher amount of energy.

(267) The market investigation indicates that XHDDs are typically manufactured with the same 2.5” Mobile and 3.5” Desktop HDDs that are used in desktop PCs and notebooks with 5,400 and 7200 rpm.²³⁵ However, some HDD suppliers, namely WD and Samsung, produce an HDD which is specifically designed to serve as an input for XHDDs as it already has a USB port on board. All XHDD suppliers have, nevertheless, found solutions for transforming bare 2.5” Mobile and bare 3.5” Desktop HDDs into XHDDs by adding XHDD features like a USB port or other interfaces.²³⁶

(268) XHDDs are mostly sold with additional features, mainly in the form of additional software such as software for back-up, security and encryption systems, sharing software, etc. Some XHDDs are further optimized through their firmware settings to provide faster recording and playback of streaming video and or further optimized with code to enable interoperability with DVRs or set top boxes ("Media XHDDs").

(269) Unlike internal HDDs, XHDDs are sold as finished products on the merchant market and substantially target different customers, mainly end-users of PC and CE devices as opposed to OEMs. XHDDs are a predominantly branded business. Suppliers have created a number of brands focusing on different customer segments of the XHDD market, like mainstream, professional, Apple Macintosh users, etc. Private labels do not play any role.

(270) The Commission did not explicitly address XHDDs in its previous decisions in the HDD sector.

²³¹ “Storage Demand Analysis System, 2009 Annual Study”, TrendFocus, March 2009, p. 97.

²³² Ibidem.

²³³ “Storage Demand Analysis System, 2010 Annual Study”, TrendFocus, February 2010, p. 36.

²³⁴ Ibidem.

²³⁵ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 42.

²³⁶ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 43.

5.2.2.1. The View of the Notifying Party

(271) The Notifying Party does not consider XHDDS as a separate product market from HDDs because on the supply-side there is no difference between internal and external drives and on the demand-side, there is a wealth of different devices serving the same storage purpose (external hard drives, but also internal hard drives, SSDs, CD/DVD etc.).²³⁷

5.2.2.2. The Commission's assessment

(272) The market participants have broadly stated that XHDDs form a separate product market that is downstream from the HDD market(s).²³⁸ The XHDD suppliers have broadly indicated that a further segmentation according to form factor or interface would not be necessary.²³⁹

(273) The qualification process needed for the introduction of a new HDD into the production process of an XHDD manufacturer is considerably faster than with other OEMs and for the most part takes only a couple of weeks depending on the sophistication of the XHDD device.²⁴⁰ XHDD OEMs are therefore the first to buy new HDDs in large quantities which helps to ramp up the production of new HDDs and to introduce new HDDs into the market.

(274) The market investigation demonstrates that it is a market where the price per GB as well as the total amount of capacity and the easy use of those products matter. Also mobility is a significant factor for end-consumers [...]*.²⁴¹ The brand is also important although it seems to a lesser extent than in other consumer goods markets.²⁴²

(275) There does not seem to be a clear distinction between 2.5" and 3.5" form factor XHDDs from a demand or supply side. All significant XHDD suppliers offer both types of XHDDs. Even Toshiba is offering a 3.5" XHDD although it does not produce itself the necessary input. No XHDD manufacturer views the form factor as a criterion for a distinct product market.²⁴³

(276) From a demand-side, there seems to be a significant extent of substitution between 2.5" and 3.5" XHDDs. It should be noted that XHDDs, unlike HDDs, are finished products which are targeted at end-customers. Therefore, there is no causal necessity for a correlation between the demand-side upstream and downstream. While the market is generally growing strongly, there also seems to be a trend to replace more and more 3.5" form factor XHDDs with 2.5" form

²³⁷ Form CO, paragraph 39.

²³⁸ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 2.

²³⁹ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 2.

²⁴⁰ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 15.

* Should read: [].

²⁴¹ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 21.

²⁴² XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 21.

²⁴³ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 2.

factor XHDDs.²⁴⁴ One reason for it is that the 2.5" XHDDs have advantages in their portability and ease to use that seem to outweigh the higher price per GB for the XHDD customer.

(277) The market investigation indicates that customers would not significantly switch to other media storage devices such as additional internal HDD storage, media recorders, writable DVDs, flash and other types of SSDs, cloud storage, etc. in the case of a permanent price increase of 5-10%.²⁴⁵ One of the reasons brought forward by an XHDD supplier is the difference "that other media storage devices are still much too expensive compared to XHDDs". XHDDs would be the most cost effective solution for high capacity needs.²⁴⁶ Another supplier explained that SSDs and Flash would not have the capacity to be sufficient to serve as backup of internal hard disk drives. The same argument can be made for DVDs. Another XHDD supplier points out that external usage requires cost performance and higher capacity like 500GB or more.²⁴⁷

(278) It may be concluded that XHDDs constitute a separate relevant product market that is downstream to the production of HDDs.

5.2.3. The geographic market definition

5.2.3.1. HDDs

(279) The Notifying Party submits that the market for HDDs is world-wide in scope. HDDs would be produced mainly in Asia and sold world-wide. Transport costs do not play a significant role and there are no significant barriers to trade. HDDs are manufactured according to the same industry standards. Sales prices are generally negotiated on a worldwide basis and do not distinguish between shipment destination or, for example, the geographic focus of a given OEM. Consequently, unit prices would not typically differ from one geographic region to another.

(280) In its most recent decision, the Commission defined the market(s) for HDDs as worldwide in scope.²⁴⁸

(281) The overwhelming majority of the respondents to the market investigation in this case confirmed that the market(s) for HDDs are worldwide in scope.²⁴⁹ Customers pointed out that they source HDDs globally, HDD prices would not differentiate between the regions and their HDD requirements are basically similar throughout the world. This applies to all relevant product markets identified within the HDD industry.

²⁴⁴ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 28.

²⁴⁵ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 3.

²⁴⁶ XHDD competitors reply to the Commission's request for information of 22 June 2011, question 3.

²⁴⁷ Toshiba reply to the Commission's request for information of 22 June 2011, question 3.

²⁴⁸ Case COMP/M.5483 - *Toshiba/Fujitsu HDD Business*, Commission Decision of 11 May 2009, paragraph 26.

²⁴⁹ Customers to the Commission's request for information of 20 April 2011, question 19, 20; Competitors to the Commission's request for information of 20 April 2011, question 32.

(282) It may therefore be concluded that the the relevant geographic market for all HDD products is worldwide in scope.

5.2.3.2. XHDDs

(283) The Notifying Party submits that the market for branded XHDDs is worldwide in scope. Generally, all suppliers would be active in all the regions of the world and prices would not deviate significantly from one region to another. The Notifying Party submits that the market would be comparable with the market for HDDs which is worldwide in scope.

(284) The Notifying Party's comparison with the market for HDDs seems to be flawed as XHDDs are finished products which are targeted to be sold to end-customers while HDDs are mostly targeted to be sold to OEMs as an input for different applications. Therefore, the conclusion that the markets for HDDs are worldwide in scope does not indicate that the market for XHDDs has to be worldwide in scope.

(285) When replying to the question relating to the scope of the geographic market, the very broad majority of XHDD suppliers indicated that the market for XHDD is worldwide in scope.²⁵⁰ However, most of the XHDD suppliers did not substantiate their responses sufficiently and in reply to a different question, they indicated that there are in fact significant differences from a supply and/or demand side between the different regions in the world.²⁵¹

(286) Indeed, XHDD suppliers indicate that product offering and consumer preferences do vary between the regions.²⁵² Also the outer design of the product might differ according to Toshiba.²⁵³ It has to be taken in account that besides the interface, software and design are important characteristics of XHDDs which distinguish them from bare HDDs. One XHDD supplier points out that in Japan there seems to be a strong preference for local brands²⁵⁴ and the connectivity of the XHDD to TV sets is of great importance.²⁵⁵ Another XHDD competitor points out that "*there is some variation between regions on preference for higher capacity and multi-media XHDDs*".²⁵⁶ Another XHDD supplier states that "*Consumers in developed countries normally have other preferences (different capacity etc.) than consumers in emerging markets for examples*".²⁵⁷

²⁵⁰ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 4.

²⁵¹ See e.g. HGST reply to the Commission's request for information of 23 June 2011, question 5; LaCie reply to the Commission's request for information of 22 June 2011, question 4. Toshiba reply to the Commission's request for information of 14 June 2011, question 72.

²⁵² XHDD competitors reply to the Commission's request for information of 22 June 2011, question 4.

²⁵³ Toshiba reply to the Commission's request for information of 22 June 2011, question 4.

²⁵⁴ Minutes of telephone conference with LaCie, 18 May 2011.

²⁵⁵ Verbatim/Freecom reply to the Commission's request for information of 22 June 2011, question 5: "... *in Japan it is different, like connectivity to TV sets is very big...*".

²⁵⁶ XHDD competitor reply to the Commission's request for information of 22 June 2011, question 4.

²⁵⁷ XHDD competitor reply to the Commission's request for information of 22 June 2011, question 4.

- (287) One internal document of Seagate indicates that the trend from 3.5" to 2.5" form factors *"is occurring at different rates within each region."*²⁵⁸
- (288) Another XHDD supplier points out that in China and other Asian countries, there are also a number of unbranded (white box) products/ do-it-yourself products available, i.e. empty casings that customers will usually equip with a refurbished bare HDD.²⁵⁹
- (289) Taking these statements in account, it is not surprising that [in 2010, Seagate's XHDD products sales were concentrated in certain of those regions]* (Asia, Americas, EEA) but not in all three regions.²⁶⁰ Samsung has 278 XHDD models out of 449 models which were only sold in one region of the world.²⁶¹
- (290) Furthermore, according to the information provided by the Notifying Party and confirmed by the respondents of the market investigation, the competitive environment seems to vary significantly across the regions as the number of significant competitors varies strongly between EEA/EMEA, USA and Asia-Pacific-Japan. Some competitors are only considerably active in certain regions of the world. For example, Buffalo, which has a market share of around 2% in the EEA, supplies nearly half of the market in Japan. Also IO Data is one of the leading players in Japan and a significant player in the Asian-Pacific region but not active at all in the EEA. Iomega is barely active in the whole Asian-Pacific region while it is the biggest non-integrated player in the EEA.[Samsung's sales are high in Korea]*.²⁶²
- (291) The Notifying Party states that it is not able to provide any market share estimates for Asia which underlines its small presence in this area. Samsung, when asked about its closest competitors in the XHDD markets, that is, those rivals to which its customers would most likely switch if its prices increased, indicated different competitors depending on the geographic region. For example, in Latin America, it would be [...]* while in the EEA, [...]*. In Asia it would be [...]*.²⁶³
- (292) Moreover, the proportion between vertically-integrated and non-integrated players is different between the regions. While in the USA the vertically-integrated market players, in particular WD and Seagate, have over 80% of the market, the Japanese market is primarily dominated by non-integrated players like Buffalo and IO Data. The EEA/EMEA has one of the highest numbers of XHDD suppliers and non-integrated players still supply over 40% of the market.

²⁵⁸ Confidential Seagate Annex 31 to the Form CO, Seagate Strategic Business plan, December 2010., p. 60.

²⁵⁹ LaCie reply to the Commission's request for information of 22 June 2011, question 4; Samsung reply to the Commission's request for information of 23 June 2011, question 11.

²⁶⁰ Based on sales data from Seagate. Reply of Seagate to the Commission RFI of 28 September 2011, question 12.

²⁶¹ Samsung reply to the Commission RFI of 28 September 2011.

²⁶² Samsung reply to the Commission RFI of 23 June 2011, question 10.

²⁶³ Samsung reply to the Commission RFI of 23 June 2011, question 10.

- (293) Internal documents of the Parties relating to XHDDs differentiate in general between different regions (mainly EEA/EMEA, USA, Asia-Pacific-Japan).
- (294) Some XHDD suppliers point out that there are differences in the marketing and sales channels in the different regions.²⁶⁴ In contrast to the HDD market(s) where the majority of sales are done to the same globally active customers, the main customers, i.e. retailers and distributors differ between the different regions.²⁶⁵ Moreover, also the primary type of customers, i.e. the most important sales channels, differs very significantly. According to the Notifying Party, the dominant XHDD sales channel in the Americas is the retail channel while in Asia and the EEA the vast majority of sales are done through distributors.²⁶⁶
- (295) It may be considered that the XHDD market(s) differ significantly across the different regions of the world. The relevant geographic market for XHDDs is therefore EEA-wide.

5.3. ASSESSMENT OF NON-COORDINATED EFFECTS

5.3.1. Introduction

- (296) Seagate is currently the largest HDD supplier in terms of revenues, and a close second to WD in terms of volume of sales for HDDs overall. It is the leading supplier on the markets for Mission Critical Enterprise HDDs ([60-70]*% market share in revenues), Business Critical Enterprise HDDs ([30-40]*% market share in revenues) and 3.5" CE HDDs ([40-50]*% market share in revenues) and the second largest supplier on the markets for 3.5" Desktop HDDs ([30-40]*% market share in revenues) and 2.5" Mobile HDDs ([10-20]*% market share in revenues).
- (297) The activities of Seagate and Samsung overlap in all the HDD markets with the exception of the market for Mission Critical Enterprise HDDs, which therefore will not be assessed for the purpose of this Decision. As a result of the proposed transaction, Seagate will become the leading player in all the HDDs markets with the exception of the market for 2.5" CE HDDs. In that market the parties' combined market share will be below [10-20]*%.
- (298) Despite Seagate's leading position in the markets for Business Critical Enterprise HDDs and 3.5" CE HDDs, the proposed transaction will not have any material impact on the competitive structure of those markets as there will only be a marginal increase in Seagate's market share ([0-5]*%) as a result of the proposed transaction.
- (299) Table 15 sets out the market shares of the HDD suppliers in each of the relevant HDD markets.

²⁶⁴ XHDD Competitors reply to the Commission's request for information of 22 June 2011, question 4.
XHDD Competitor reply to the Commission's request for information of 14 June 2011, question 72.

²⁶⁵ XHDD Competitor reply to the Commission's request for information of 22 June 2011, question 4.

²⁶⁶ Seagate reply to the Commission's request for information of 23 June 2011, question 5.

HDD SUPPLIERS	ALL HDDs	MISSION CRITICAL ENTERPRISE	BUSINESS CRITICAL ENTERPRISE 3.5"	DESKTOP3.5"	MOBILE2.5"	CE	
						3.5"	2.5"
Seagate	[30-40]*%	[60-70]*%	[30-40]*%	[30-40]*%	[10-20]*%	[40-50]*%	[5-10]*%
Samsung	[5-10]*%	-	[0-5]*%	[10-20]*%	[10-20]*%	[0-5]*%	[0-5]*%
COMBINED	[40-50]*%	[60-70]*%	[30-40]*%	[50-60]*%	[30-40]*%	[40-50]*%	[10-20]*%
WD	[20-30]*%	[0-5]*%	[30-40]*%	[30-40]*%	[20-30]*%	[40-50]*%	[0-5]*%
HGST	[10-20]*%	[20-30]*%	[20-30]*%	[10-20]*%	[20-30]*%	[10-20]*%	[30-40]*%
Toshiba	[10-20]*%	[5-10]*%	-	-	[10-20]*%	-	[50-60]*%
Market size (million EUR)	[...]*	[...]*	[...]*	[...]*	[...]*	[...]*	[...]*
Market size (thousand units)	[...]*	[...]*	[...]*	[...]*	[...]*	NA	NA
Revenue share of sales in each market out of overall HDD sales²⁶⁷	[90-100]*%	[10-20]*%	[5-10]*%	[20-30]*%	[30-40]*%	[5-10]*%	[5-10]*%

Table 15: Worldwide markets shares of HDDs suppliers in 2010

Source: Notifying Party's internal estimates; Oanda.com; IDC.

(300) The Commission assessed the competitive effects of the proposed transaction on each of the relevant markets (with the exception of the worldwide markets for Mission Critical Enterprise HDDs and 2.5" CE HDDs).

²⁶⁷ Figures are rounded. Overall HDD market also includes sales of 1.8" HDDs.

(301) In line with the priority principle set out in Section 4, the relevant framework of assessment is that pre-merger, Seagate, WD, HGST, Toshiba and Samsung are the competitors on the market for 3.5" Business Critical HDDs and on the market for 2.5" Mobile HDDs, and WD, Seagate, HGST and Samsung remain as competitors on the markets for 3.5" Desktop HDDs and 3.5" CE HDDs.

(302) It is apparent that the proposed transaction will not significantly impede effective competition in any of the worldwide HDD markets as well as on the EEA-wide XHDD market (Section 5.2.2).

5.3.2. The Commission's general approach on the HDD markets

5.3.2.1. The View of the Notifying Party

(303) The Notifying Party submits that the market for the supply of HDDs is extremely competitive and there are characteristics of the market that ensure that the proposed transaction will not significantly impede effective competition.

(304) First, the Notifying Party submits that Samsung is the smallest competitor in the overall market as well as in most end-use segments. Samsung has consistently lost money since it outsourced the entire component production process to third parties and has extremely low margins.

(305) Second, Samsung is not Seagate's closest competitor and it plays no price leader or maverick role in any of the HDD markets, whilst Seagate's major rivals are WD, Hitachi and Toshiba.

(306) Third, the Notifying Party submits that HDD manufacturers' customers (mostly OEMs and distributors)²⁶⁸ enjoy significant countervailing buyer power. OEMs multisource their HDD requirements and source their supplies under short term contracts. Bilateral negotiations are conducted simultaneously with competing suppliers. Switching costs and brand loyalty are low and OEMs switch a proportion of their HDD purchases on a quarterly basis. In particular, the Notifying Party stresses that three suppliers of any type of HDDs is clearly sufficient to enable customers to effectively multisource to obtain better terms and prices from HDD suppliers.²⁶⁹

(307) As regards capacity constraints, the Notifying Party points out that HDD manufacturers can quickly expand capacity, at a relatively low cost. Similarly, no capacity constraints exist on inputs to HDDs.

(308) Furthermore, the Notifying Party submits that the life cycle of HDDs is 2 years or less, with suppliers bringing new/improved products to market every 12-18 months.

²⁶⁸ For example, in its financial year ending 2 July 2010, [...] % of Seagate's sales were made to OEMs, [...] % to distributors and [...] % to retail.

²⁶⁹ Seagate comments of 13 June 2011 on Article 6(1)(c) Decision of 30 May 2011, p. 13.

- (309) According to the Notifying Party, the average sales price of HDDs has been declining consistently, dropping by more than 50% in the last 10 years. This has put pressure on industry participants to reduce costs, increase efficiency and invest in R&D.
- (310) As regards potential entry/expansion, the Notifying Party submits that there are various suppliers of HDD components, contract manufacturers of HDDs and previous manufacturers of HDDs which could commence supply of HDDs in the short term. OEM customers are also able to sponsor an entrant since a single OEM can provide sufficient volume to cover the associated fixed costs. Also, current HDD suppliers may easily begin to supply HDD products in which they are not currently active. In particular, as regards Desktop applications, the Notifying Party submits that since Toshiba was once active and already produces 3.5" Enterprise drives, it could quickly develop a meaningful presence in Desktop applications.
- (311) The Notifying party submits that customers sponsoring other technologies such as flash memory, other SSD products and cloud-based data storage products impose an increasing competitive constraint on the HDD market.²⁷⁰

5.3.2.2. The Commission's analytical framework

- (312) In making its competitive assessment on the relevant HDD markets, the Commission applies the following principles from its Horizontal Merger Guidelines.
- (313) A merger may significantly impede effective competition in a market by removing important competitive constraints on one or more sellers, who consequently have increased market power. The most direct effect of the merger will be the loss of competition between the merging firms. Generally, a merger giving rise to such non-coordinated effects would significantly impede effective competition by creating or strengthening the dominant position of a single firm, one which would have an appreciably larger market share than the next competitor post-merger.²⁷¹
- (314) Furthermore, mergers in oligopolistic markets involving the elimination of important competitive constraints that the merging parties previously exerted upon each other together with a reduction of the competitive pressure on the remaining competitors may, even where there is little likelihood of coordination between the members of oligopoly, result in a significant impediment to effective competition.²⁷²

²⁷⁰ Form CO, pp. 55 and 56.

²⁷¹ Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (Horizontal Merger Guidelines), Official Journal C 31, 05.02.2004, p. 5, , paragraph 24.

²⁷² Horizontal Merger Guidelines, paragraph 25.

(315) On each of the affected HDDs markets, therefore, the Commission has assessed whether the proposed transaction would remove an important competitive constraint between Seagate and Samsung on that market and whether competitive pressure on the remaining competitors would be reduced.

(316) With regard to the likelihood of significant non-coordinated effects, the Commission has made its assessment in light of the following factors that are relevant according to the Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings.²⁷³

- (1) The market shares and concentration levels that would result from the proposed transaction;
- (2) The closeness of competition between Seagate and the Samsung HDD Business;
- (3) The post-merger possibilities for customers to switch suppliers;
- (4) The likelihood that competitors would increase supplies if prices increase post-merger; and
- (5) The likelihood that the proposed transaction would remove an important competitive force on the market.

(317) The results of the Commission's investigation show that the proposed transaction will not significantly impede effective competition on any of the relevant HDDs markets.

5.3.2.3. Common issues on the HDD markets

(318) The market structure and competitive dynamics vary for each of the relevant HDDs markets. A number of factors are nonetheless relevant for the Commission's competitive assessment of each of those markets.

Commodity v. differentiated products

(319) The Commission's investigation revealed that HDD products are not pure commodity products. Thus, although brand loyalty does not appear to be strong and OEMs can switch their HDD purchases between the different HDD competitors, products on the relevant HDD markets display features of differentiated products.

(320) Consistent with this finding, [Deposition of Seagate executive to the Federal Trade Commission]*.²⁷⁴

²⁷³ Horizontal Merger Guidelines, paragraphs 24 to 38.

²⁷⁴ [Deposition of Seagate executive to the Federal Trade Commission]*.

- (321) Standard interfaces allow for switching between different HDD suppliers, but at the same time induce HDD competitors to innovate in order to improve the drives' storage capacity, head or media design, architecture and mechanical engineering. As mentioned in Section 5.1.4, the Commission's investigation confirmed that technology and product innovation are important. Evidence submitted by the [...]*.²⁷⁵ This gives a further indication that HDD products are to a certain degree differentiated products.
- (322) Desktop OEMs confirm that factors such as performance (rotation, seek speed), reliability, noise and energy consumption of HDDs are important factors in their purchasing decisions on the relevant HDD markets. As concerns performance and reliability, a large majority of Desktop OEMs list these factors as a number 1 or 2 priority in their purchasing decisions.²⁷⁶ The vast majority of these OEMs confirm the same for energy consumption, and list HDD noise levels as a number 1, 2, or 3 priorities among their top priorities. Distributors who responded to the Commission's requests for information confirm this to a lesser extent. A third of those distributors confirm that performance and reliability are a number 1 or 2 priority and the same proportion confirms that energy consumption and noise are a top 3 priority.
- (323) Moreover, OEMs do not consider that HDD competitors all offer the same levels of product quality. For instance, the results of the market investigations showed that while certain OEMs consider Seagate a good quality supplier the same OEMs do not have the same opinion of Samsung's drives.²⁷⁷
- (324) In this respect, the customers interviewed confirmed that the most important criteria driving their purchasing decisions are technical performance, product quality and reliability, low price and product availability, as well as HDDs suppliers' ability to execute their product roadmap.²⁷⁸
- (325) Most of those criteria indicate that HDD products and suppliers are, at the very least, differentiated to a certain extent
- (326) On the basis of these findings, it may be concluded that products on the HDD markets have features of differentiated products.

Procurement process/multi-sourcing

- (327) The Commission's investigation confirmed that OEMs typically multisource from the different HDD suppliers.²⁷⁹ Even distributors seem to multisource from the

²⁷⁵ [...]*

²⁷⁶ Customers reply to the Commission's request for information of 19 April 2011, question 7.

²⁷⁷ Customers reply to the Commission's request for information of 19 April 2011, questions 44 and 45.

²⁷⁸ Customers reply to the Commission's request for information of 22 June 2011, question 35.

²⁷⁹ Customers reply to the Commission's request for information of 22 June 2011, question 51. From 26 OEM respondents of the market investigation, 3 respondents said that they require 4 suppliers, 16 respondents stated that they require 3 suppliers and 7 respondents consider 2 as a minimum.

HDD suppliers.²⁸⁰ OEMs then generally award their actual HDD purchases between two and four suppliers in any given market.²⁸¹ For instance, an OEM can grant 40% to the most competitive bidder, 30% to the second most competitive bidder, followed by 20% and 10% for a third or fourth bidder.

(328) The Commission's investigation also indicated that this practice of multi-sourcing is important for HDD customers. Key drivers of these multi-sourcing strategies are security of supply and the ability to play HDD competitors off against each other in order to secure competitive prices.²⁸² The majority of customers currently observe some degree of correlation between the difference in purchases allocation and the price behaviour of the HDD suppliers. For instance, the bigger the share of purchases allocated to one bidder is compared to the others, the more aggressive with regard to price the bidders are.²⁸³

(329) Most OEMs confirmed that a minimum number of three suppliers is required in order to apply an effective multi-sourcing policy.²⁸⁴ The majority of OEMs who responded to the Commission's requests for information are reluctant to allocate more than 60%-70% to a single supplier.²⁸⁵ As acknowledged by three large OEMs, the main reasons underlying this sourcing pattern are security of supply to minimise the risk of supply disruptions as well as cost considerations. For this reason one important OEM has indicated that "*we do try to make sure that we don't have too much of our TAM [total available market] locked into one or two suppliers in order to minimize risk*".²⁸⁶ One significant OEM indicated that three suppliers are needed for an effective multisource strategy to mitigate supply risk and drive aggressive costs.²⁸⁷

(330) [Deposition of Seagate executive to the Federal Trade Commission]*.²⁸⁸

Different customer groups

(331) Sales to OEMs alone represented [...] % of Seagate's total sales in 2010, as opposed to Samsung's sales to OEMs which only accounted for [...] % of its total sales in the same business year.²⁸⁹ In revenue terms, Samsung's 2010 sales to OEMs amounted to approximately USD [...] * as opposed to USD [...] * generated through the distribution channel.²⁹⁰ This is confirmed from Samsung's

²⁸⁰ Customers' reply to the Commission's request for information of 22 June, question 51; 7 out of 9 distributors multisource.

²⁸¹ Customers reply to the Commission's request for information of 19 April 2011, question 33.

²⁸² Customers reply to the Commission's request for information of 20 April 2011, question 36. A large OEM noted: "*All companies have multi-sourcing policies. There would otherwise be a risk to lose competitiveness from a technology point of view*" (Minutes of a meeting, 15 June 2011).

²⁸³ Customers reply to the Commission's request for information of 22 June 2011, question 58.

²⁸⁴ Customers reply to the Commission's request for information of 19 April 2011, question 65. 19 OEMS out of 26 indicated that they would need at least 3 or more suppliers while 7 indicated that 2 might be enough.

²⁸⁵ Customers reply to the Commission's request for information of 22 June 2011, question 55.

²⁸⁶ Customers reply to the Commission's request for information of 19 April 2011, question 34.

²⁸⁷ Customers reply to the Commission's request for information of 19 April 2011, question 65.

²⁸⁸ [Deposition of Seagate executive to the Federal Trade Commission]*.

²⁸⁹ Seagate reply of 13 June to the Article 6(1)(c) Decision of 30 May 2011, p. 7.

²⁹⁰ Samsung reply to the Commission's request for information of 20 of April 2011, Annex 7.

internal documents showing that it sells 3.5" HDDs to only [...] top 10 PC OEM customers in comparison to Seagate and WD which in turn sell to [...] and HGST which sells to [...]. According to the same document, Seagate sells 2.5" HDDs to [...] of the top 10 OEMs, WD, HGST and Toshiba to [...] while Samsung only to [...] of them.²⁹¹

(332) Samsung appears to be a less significant supplier to OEMs compared to Seagate and the other HDD competitors.

Importance of vertical integration

(333) Vertical integration seems to offer significant advantages over non-integrated players in the HDD industry. The primary advantage of vertical integration seems to be that it enables competitive cost and greater sourcing flexibility. This might lead to increased profitability, that is to say, market share increases, increased gross margins and increased operating margins. [This view is supported by the Parties' internal documents]*.^{292 293}

(334) [This view is supported by the Parties' internal documents]*.^{294 295 296}

(335) The importance of coordination between HDD suppliers and upstream component suppliers is also reflected by Toshiba's recent decision to establish two technology development centres for HDDs in cooperation with its component suppliers TDK and Showa Denko K.K. ("Showa Denko"). Toshiba, in cooperation with TDK expects to develop stable manufacturing methods for future HDDs and to achieve the very earliest launch of differentiated products.²⁹⁷

(336) Also a number of customers which replied to the market investigation confirmed that vertical integration represents a clear advantage for HDD manufacturers, particularly as it allows suppliers to better control the quality of the material and inputs of the final product. One important CE OEM even indicated that one of the reasons why it decided not to qualify Samsung as a supplier is its lack of vertical integration.²⁹⁸

(337) The significance of vertical integration as a distinctive competitive advantage of HDD suppliers will be taken into account by the Commission in its assessment of the closeness of competition between Seagate and Samsung and the likelihood

²⁹¹ Samsung Annex 6.9 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p. 11.

²⁹² Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

²⁹³ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

²⁹⁴ Confidential Samsung Annex 6.9 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p.11.

²⁹⁵ Confidential Samsung Annex 6.11.2 to the Form CO, "Income Trend and its Implications" Storage Support Team, January 2011, p. 47.

²⁹⁶ Confidential Samsung Annex 6.9 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p. 21.

²⁹⁷ <http://www.storagenewsletter.com/news/business/toshiba-hdd-technology-centres>.

²⁹⁸ Customers to the Commission's request for information of 19 April 2011, question 58.

that the proposed transaction would remove an important competitive force on the market.

HDD competitors have different strengths and strategies

(338) The Commission has assessed the competitive strengths of each of the HDD competitors on the basis of the various benchmarks identified by the HDD customers: product breadth, product availability and execution of product roadmaps, product quality, technology and cost effectiveness/price.

General strengths and strategy of Seagate

(339) Seagate has one of the broadest portfolios in the HDD industry.²⁹⁹

(340) Seagate has scale and is the leader in revenue in overall HDD sales with a [30-40]*% share in 2010. Like WD and HGST, it is vertically integrated upstream into the production of heads and other HDD components. Innovation is listed as one of Seagate's strengths.³⁰⁰ However, respondents to the Commission market investigation have reported instances of quality issues with certain Seagate products.³⁰¹

General strengths and strategy of Samsung

(341) Samsung is the smallest player in the overall HDD industry with a market share of [10-20]*%. This is in particular due to its very limited footprint in the CE HDD market (both 3.5" and 2.5"), its negligible presence in the Business Critical HDD market and its absence from the lucrative Mission Critical Enterprise space. For this reason, one investment analyst qualifies Samsung as a marginal player which has struggled to move beyond 10-11% market share during the past 5 years.³⁰²

(342) The Notifying Party seems to take the same view. First, in its [internal documents]* it points to Samsung's lack of offer in the lucrative Mission Critical Enterprise segment and its limited product breadth as two main weaknesses which undermine Samsung's ability to compete.³⁰³ Second, Seagate notes in the same document that despite Samsung's recent strength in its ability to maintain time to the market in Desktop and Notebooks products, its lack of vertical integration creates risk for its time to the market position due to the high costs and lack of scale to spread operating expenses resulting from Samsung's total dependence on component suppliers.³⁰⁴

(343) Third, in another internal document, Seagate remarks that Samsung operating and gross margins are significantly lower in comparison to the three top tier HDD

²⁹⁹ See Table 3 and Table 4.

³⁰⁰ Customers reply to the Commission's request for information of 19 April 2011, question 41.

³⁰¹ Customers reply to the Commission's request for information of 19 April 2011, question 44. "Citigroup- Hard Disk Drives", p. 42.

³⁰³ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³⁰⁴ Ibidem.

market players.³⁰⁵ The same finding is acknowledged by Samsung [in its internal documents]*.³⁰⁶ It follows from this that Samsung's ability to invest in new technology to maintain its time to market and by consequence its competitiveness is constrained.

(344) According to Seagate's [internal documents]*, while Samsung enjoys industry leadership in flash memory as compared to the other HDD suppliers (which in turn allows it to be a leader in the emerging SSDs products) it does not appear to have any competitive advantage with respect to its competitors in any of the HDD markets.³⁰⁷ [...]*.³⁰⁸

(345) [...]*.³⁰⁹

(346) In another internal document, Samsung acknowledges the main weaknesses of its business model, namely: (i) weakness in economies of scale (lack of large OEM customers and weak market share, lack of product line-up in important Enterprise segments and high rpm HDDs, [...]*) ; (ii) weakness in the development of original technologies (lack of manpower for next-generation development; absence of component development organisation and high dependence on component suppliers); (iii) difficulties to expand production capacity; (iv) weak supply chain [...]*; (v) weak cost competitiveness [...]*; and (vi) lack of foundation for number 1 quality [...]*.³¹⁰

(347) [...]*.^{311 312 313}

(348) In addition, Samsung remarks that the number of patents it holds is significantly lower in comparison to Seagate and HGST.³¹⁴ [...]*.³¹⁵

(349) [...]*.³¹⁶

(350) [...]*.³¹⁷ [...]*.³¹⁸ [...]*.³¹⁹

³⁰⁵ Confidential Samsung Annex 3 to the Form CO, Seagate "Project Jewel-SFTC Discussion", 25 March 2011, p.4.

³⁰⁶ Confidential Samsung Annex 6.10 to the Form CO, "Storage business Direction", November 2010, p. 3.

³⁰⁷ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³⁰⁸ [Deposition of Seagate executive to the Federal Trade Commission]*.

³⁰⁹ Confidential Samsung Annex 6 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p. 10.

³¹⁰ Confidential Samsung Annex 7 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, "Current status analysis and pending issues", p. 13.

³¹¹ Confidential Samsung Annex 6 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p. 9.

³¹² Confidential Samsung Annex 6 to the Form CO, "Storage business Direction", November 2010, p. 2

³¹³ Confidential Samsung Annex 6 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p. 8.

³¹⁴ Confidential Samsung Annex 6 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p. 7.

³¹⁵ Letter addressed to FTC by Seagate external counsel, of 24 June 2011 pp. 9-10.

³¹⁶ Confidential Samsung "Storage business Direction", December 2010, p. 6, submitted by email to the Commission on 14 July 2011.

(351) [...]***³²⁰

(352) The market investigation also revealed that Samsung is perceived as a minor player in the HDD market as compared to the other players. In this regard, one significant OEM indicated that Samsung does not have a sufficient product portfolio and that it does not exert a sufficient competitive pressure on the two large players, notably Seagate and WD. The same OEM also underlined that it was never confident in Samsung as a full blown player and that at times their roadmaps were inconsistent.³²¹ Another large PC OEM pointed to Samsung's incomplete product portfolio and its lack of solid relationships with any major OEM as a main weakness of its competitive strategy.³²²

(353) Moreover, PC OEMs almost unanimously confirmed that Samsung is not an innovator as opposed to Seagate which has been repeatedly qualified as a technology leader in the HDD market.³²³ For example, one significant OEM indicated that although Samsung was sometimes successful in being the first to the market in relation to 1.8" HDDs, it did not reach the same outcome in the other HDD market segments due to problems in executing its development plans. Another OEM explained that Samsung has not invested in engineering talent to develop critical head and media technology needed for future products and it does not have enough critical mass to invest at the rate of its competitors.³²⁴

(354) Similar considerations were raised by some respondents to the market investigation with respect to the quality of Samsung's HDDs. For instance, three large PC OEMs submitted that Samsung's HDDs are not of high quality. One distributor pointed out that *in comparison to other major HDD well known manufacturers, it is a matter of fact that the average failure rate of Samsung HDD's is higher*. Finally, a CE OEM explained that in its view Samsung's poor quality is caused by its lack of vertical integration as well as its outsource of HDDs' assembly which do not allow the latter to have the same control over the quality and performance of its products as compared to WD, Seagate and Hitachi.³²⁵

(355) In conclusion, the vast majority of respondents to the Commission's investigation confirmed that their alternative supplier to Seagate is rarely Samsung as compared to WD and HGST which are mentioned much more frequently.³²⁶

(356) In light of the above, it appears that Samsung has a limited competitive strength in the various HDD markets and, is not the closest competitor to Seagate.

³¹⁷ Confidential Samsung Annex 6 to the Form CO, "Storage business Direction", November 2010, p. 4.
³¹⁸ Confidential Samsung Annex 6 to the Form CO, "Storage business Direction", November 2010, p. 4.
³¹⁹ Confidential Samsung Annex 6 to the Form CO, "Storage business Direction", November 2010, p. 6.
³²⁰ Confidential Samsung Annex 6 to the Form CO, "Strategic Focus".
³²¹ Minutes of a phone call held on 8 July 2011.
³²² Customers reply to the Commission's request for information of 19 April 2011, question 42.
³²³ Customers reply to the Commission's request for information of 19 April 2011, question 42.
³²⁴ Customers reply to the Commission's request for information of 22 June 2011, question 64.5.
³²⁵ Customers reply to the Commission's request for information of 19 April 2011, questions 45 and 45.2.
³²⁶ Customers reply to the Commission's request for information of 19 April 2011, question 54.

General strengths and strategy of WD

- (357) WD's product portfolio is amongst the broadest of the HDD competitors.³²⁷
- (358) [This view is shared by Seagate's executives]*.^{328 329}
- (359) Like HGST and Seagate, it is vertically integrated upstream, which assists it in offering a flexible and high-quality supply of heads and other HDD components.
- (360) Respondents to the market investigations generally confirmed that assessment qualifying WD's operational excellence, growing portfolio, vertical integration, scale and ability to quickly react to industry conditions as its main strengths.³³⁰

General strengths and strategy of HGST

- (361) HGST's product portfolio covers virtually 100% of product offerings on the HDD markets.[...]*.
- (362) HGST also owns critical HDD component technologies, enjoys significant technological know-how and resources and is a leading innovator.³³¹
- (363) [HGST is able to be opportunistic due to its small size and has recently gained share in the notebook and mission critical enterprise markets, as recognised by the Notifying Party in its internal documents]*.^{332 333}
- (364) The market investigation also confirmed that product quality and increasing innovation have been important parameters in HGST competitive strategy.
- (365) In this respect, several respondents to the market investigation indicated that HGST is one of the main innovators among HDD suppliers, particularly in the Mobile HDD market and a high quality supplier.³³⁴ As an illustration, one important PC OEM submitted that HGST's main strengths are its broad portfolio, its vertical integration, strong technology and quality in all segments. Another significant OEM qualifies HST as the *quality leader*.³³⁵
- (366) Customers also generally confirm that WD, Seagate and HGST are the main competitors, while Samsung is a smaller player.³³⁶

³²⁷ See Tables 3 and 4.

³²⁸ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³²⁹ [Deposition of Seagate executive to the Federal Trade Commission]*.

³³⁰ Customers reply to the Commission's request for information of 19 April 2011, question 51.

³³¹ Form CO, p. 24.

³³² Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³³³ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³³⁴ Customers reply to the Commission's request for information of 22 June 2011, question 73.

³³⁵ Customers reply to the Commission's request for information of 19 April 2011, question 51.

³³⁶ Minutes of a telephone conference with a large PC OEM on 8 July 2011.

(367) Industry analysts too regard WD, Seagate and Hitachi as the top three players which are all vertically integrated and essentially control the overall HDD market with a combined 79% market share.³³⁷

General strengths and strategy of Toshiba

(368) Toshiba's apparent strategic focus is on 2.5" and smaller form factor HDDs, as well as on HDDs sold in Enterprise markets. This is reflected in its moderate share of the 2.5" Mobile HDD market and its significant share in the 2.5" HDDs. In the Mission Critical Enterprise space, Toshiba has a modest presence, however, as recently acknowledged by [a Seagate executive]*, it appears that recently Toshiba's performance has improved therefore making the latter more competitive:

[Deposition of Seagate executive to the Federal Trade Commission]*.³³⁸

(369) Toshiba is currently absent from the large 3.5" Desktop and CE markets which together represent 34% of the overall HDD market. Indeed, as noted by an investment analyst *"the most glaring reason for Toshiba's limited market share is their historical absence in the 3.5" desktop PC market. Instead, the strategic focus has been on the notebook and smaller form factor (1.8" or less) HDDs markets"*.³³⁹

(370) The same view is also shared by the Notifying Party [...]*.³⁴⁰

(371) Also two important OEMs which replied to the market investigation confirmed that despite Toshiba's strategic focus on Mission Critical Enterprise and Notebook products, Toshiba's lack of offer in the 3.5" HDDs space (notably, for Desktop and CE applications) is one of its main weaknesses coupled with the lack of vertical integration.³⁴¹ As a result of this, Toshiba has been successful in exerting competitive pressure in the Mobile and 2.5" CE markets while being absent from the 3.5" HDDs platform.

(372) Unlike Seagate, WD and HGST, Toshiba is not vertically integrated but fully relies on third parties suppliers.

Conclusion

(373) Account is to be taken of the Commission's findings on the relative strengths of the HDD competitors when analysing the closeness of competition between Seagate and Samsung in the Desktop and Mobile HDDs markets (Section 5.3.3.2 and 5.3.4.2) and the impact that the removal of Samsung as an independent supplier will have on the HDD markets where it is present.

³³⁷ "Citigroup- Hard Disk Drives", p. 40.

³³⁸ [Deposition of Seagate executive to the Federal Trade Commission]*.

³³⁹ "Citigroup- Hard Disk Drives", p. 42.

³⁴⁰ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³⁴¹ Customers reply to the Commission's request for information of 19 April 2011, question 51.

- (374) In previous merger cases concerning the HDD industry, the Commission already found that entry by new competitors on any of the HDD markets was unlikely.³⁴² This was inter alia due to the high barriers to entry which appear to characterize the market, namely, the high capital expenditures required, economies of scale and the necessary IP rights which are held by the current HDD suppliers. The Notifying Party's internal documents support these findings too.³⁴³
- (375) The Commission's investigation in this case confirmed its past findings. Customers almost unanimously discarded the possibility of new entrants into the HDD market in light of the barriers to entry referred to in Recital 375, that new competitors would face.³⁴⁴ There are no other indications for future entry either.
- (376) It may be concluded that significant entry by a new HDD competitor in the near future is improbable.
- (377) In any event, regardless of the assessment of entry on any of the HDDs market in the near future, the results of the Commission's investigation have shown that the proposed transaction will not significantly impede effective competition in any of the HDDmarkets.

5.3.3. The market for 3.5" Desktop HDDs

5.3.3.1. The View of the Notifying Party

- (378) Seagate submits that even if one were to assess the transaction in the context of narrow relevant HDD markets, a number of elements exist, which would show that the proposed transaction would not give rise to a significant impediment to effective competition. Those elements would exist in each of the narrow markets, including the market for 3.5" Desktop HDDs.
- (379) First, Samsung would not significantly constrain Seagate's sales to OEMs and Samsung would not develop into a stronger competitor in the absence of the transaction.
- (380) In terms of market shares, Samsung is the smallest of the HDD suppliers. Additionally, unlike Seagate, Samsung would not be a significant supplier to OEMs. Only [...] *% of Samsung's sales are to OEMs – and only [...] * feature in both Seagate and Samsung's list of top 10 customers. No sales appear to have taken place by Samsung to [...] * since January 2011.
- (381) Seagate and Samsung would not be close competitors. [...] * An analysis of [internal data] * submitted by Seagate would suggest that since 2009, Samsung was identified as a competitor to Seagate for only a small number of OEMs. As regards the overall market for HDDs, Samsung is identified as a competitor in

³⁴² Case No.COMP/M.5483 - Toshiba/Fujitsu HDD Business, paragraph 34, Commission Decision of 11 May 2009.

³⁴³ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³⁴⁴ Customers reply to the Commission's request for information of 19 April 2011, questions 85 and 85.1.

only [5-10]*% of the instances. As regards the market for desktop HDDs, Samsung was identified as a competitor in [5-10]*% of the cases.

- (382) There is also no evidence that Samsung is a price leader or that Samsung is an important innovator. According to Seagate, Samsung has never been the first to introduce new 3.5" products in the last 11 years.
- (383) Second, three suppliers of any type of HDD would be sufficient for customers.
- (384) Since Samsung has only a limited OEM profile, is not the closest competitor of Seagate and is a weak 3.5" HDD supplier to OEMs, the structural change in the supply of 3.5" HDDs to OEMs that would result from the proposed transaction would be limited.
- (385) OEMs would still be able to discipline the conduct of the three remaining suppliers in the 3.5" segment by redistributing their demand among these suppliers. Given the large economies of scale and the fast product innovation which makes products less appealing fairly quickly and eventually obsolete, suppliers would have a strong incentive to secure a large share of buyers' total addressable market.
- (386) Also an economic analysis submitted by Seagate³⁴⁵ would suggest that the bid outcomes are not less favourable in situations where there are three bidders rather than four. Seagate's prices have not been higher when there were only two other bidders besides Seagate than when there were three.
- (387) Third, there would be enough spare production capacity in the HDD industry and rivals would have the ability to expand their production very quickly. With three suppliers of desktop 3.5" HDDs, Seagate would not have the ability or incentive to restrict supply as attempts to do so would result in a shift of demand to other suppliers.
- (388) Fourth, Seagate submits that the proposed transaction will not reduce its incentives to innovate.
- (389) Fifth, SSDs and Hybrid HDDs would in the near future become directly substitutable for more HDDs. Also, the expansion of cloud computing would impact the HDD market, constraining the merged entity's behaviour post merger.
- (390) Sixth, Toshiba would be a strong competitor that can easily enter the 3.5" desktop HDD segment given its presence in the 3.5" near-line HDDs. According to Seagate, Toshiba would have an established relationship with OEMs, which would provide Toshiba with sufficient scale to supply 3.5" desktop HDDs should the merged entity engage in price increases. Although 3.5" HDD margins are lower than 2.5" HDD margins (where Toshiba is particularly strong), an increase in price of 5-10% in relation to 3.5" HDDs would result in broadly equivalent margins, increasing Toshiba's incentives to enter the space.

³⁴⁵

Notifying Party's reply to the Article 6(1)(c) Decision of 30 May 2011.

5.3.3.2. The Commission's assessment

Introduction

- (391) As follows from Table 15, the estimated size of the worldwide 3.5" Desktop HDD market in 2010 was EUR 7 billion. This accounted for 28% of worldwide HDD sales.
- (392) As follows from Table 2, although sales of 2.5" HDDs are expected to grow more than those of 3.5" HDDs, sales on the 3.5" Desktop market are nonetheless forecasted to be significant in the next years.³⁴⁶ It is therefore clear that the 3.5" Desktop market will remain a large and important HDD market in the near future.
- (393) The customers in the 3.5" Desktop market are large OEMs and distributors. Large OEMs include for instance Acer, Apple, Asustek, Dell, Fujitsu, HP, Lenovo, Medion and Positivo.
- (394) The 3.5" Desktop market has a highly concentrated supply-side. In the relevant pre-merger counterfactual, four competitors remain on the 3.5" Desktop HDD market: WD ([30-40]*% revenue share), Seagate ([30-40]*%), Samsung ([10-20]*%) and HGST ([10-20]*%). Toshiba does not manufacture 3.5" HDDs for desktop end uses.
- (395) Consistent and particularly pronounced quarterly price decreases have been observed on the 3.5" Desktop HDD market, as illustrated by figure 6

³⁴⁶ Industry analysts for instance report that for in-office use, corporations tend to still favour Desktop PCs for cost and security considerations. See for instance Deutsche Bank, "The HDD Industry-A changing landscape", 11 May 2010, p. 20.

Weighted average price of 3.5" Desktop products sold by WD, Hitachi, Seagate and Samsung

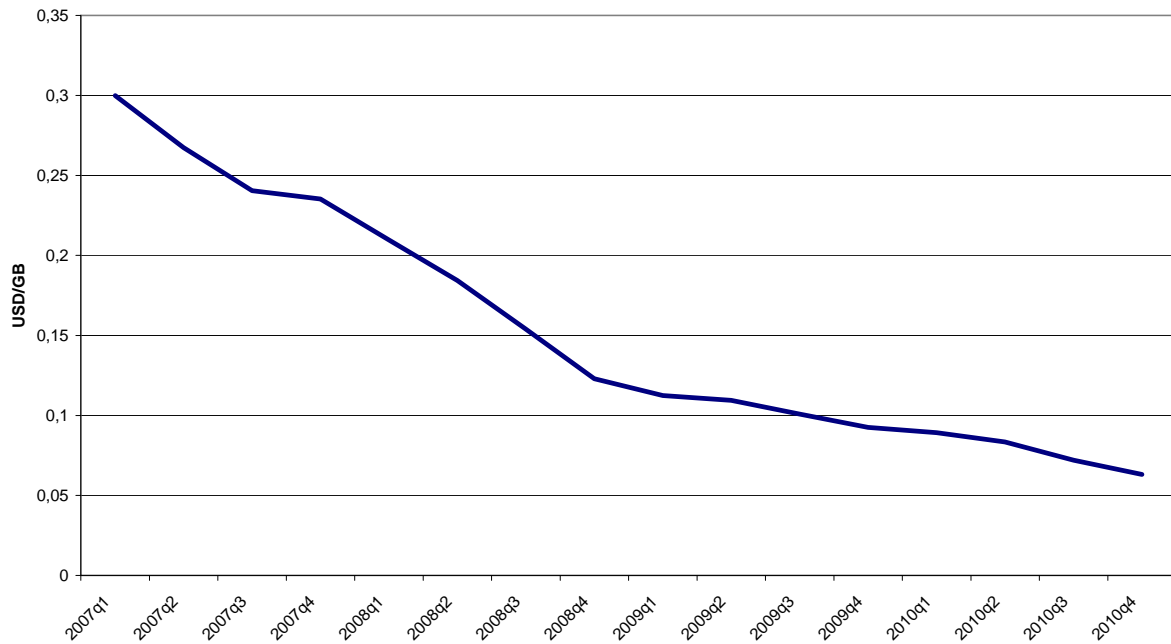


Figure 4: Weighted average price of 3.5" Desktop products sold by WD, Hitachi, Seagate and Samsung

The impact of the proposed transaction

Strong competition

(396) Although market shares and additions of market shares only provide first indications of market power and increases in market power, they are normally important factors in the assessment. The larger the market share, the more likely a firm is to possess market power. Furthermore, the larger the addition of the market share, the more likely it is that a merger will lead to a significant increase in market power.³⁴⁷

(397) The market shares of the HDD suppliers on the 3.5" Desktop market are as follows:

	2006	2007	2008	2009	2010
Seagate	[30-40]*%	[40-50]*%	[30-40]*%	[30-40]*%	[30-40]*%
Samsung	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%
COMBINED	[50-60]*%	[50-60]*%	[50-60]*%	[50-60]*%	[50-60]*%

³⁴⁷ Horizontal Merger Guidelines paragraph 27.

WD	[30-40]*%	[30-40]*%	[30-40]*%	[30-40]*%	[30-40]*%
HGST	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%
Others	[0-5]*%	[0-5]*%	[0-5]*%	[0-5]*%	[0-5]*%

Table 16: Worldwide market shares 2006-2010 (in value)

	2006	2007	2008	2009	2010
Seagate		[40-50]*%	[40-50]*%	[40-50]*%	[30-40]*%
Samsung		[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%
COMBINED		[50-60]*%	[50-60]*%	[50-60]*%	[40-50]*%
WD		[30-40]*%	[30-40]*%	[30-40]*%	[40-50]*%
HGST		[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%
Others		[0-5]*%	[0-5]*%	[0-5]*%	[0-5]*%

Table 17: Worldwide market shares 2006-2010 (in volume)

Source: Notifying Party's estimates

(398) As can be seen in the Table 16 and Table 17, Seagate is one of the leading suppliers on the 3.5" Desktop market, with a [30-40]*% market share in value. The market share increment that the proposed transaction brings about is [10-20]*%. Post-merger, the merged entity would have a combined market share of [50-60]*% in value and become the new market leader.

(399) However, post-merger, the merged entity will continue to face competition from WD and HGST, two strong suppliers which will hold market shares (in value) of [30-40]*% and [10-20]*% respectively.

(400) As can be seen from Table 17, WD is currently the number one player on the 3.5" Desktop market. Its general competitive strengths are its brand, its flexibility, its operational excellence and its cost effectiveness.³⁴⁸

(401) Although HGST and Samsung have similar shares, the Commission's market investigation showed that Samsung is a weaker player and that HGST enjoys more important competitive strengths than its market share might suggest. In this

³⁴⁸ Customers reply to question 51 of the Commission's request for information of 19 April 2011.

regard, HGST exerts a stronger competitive pressure than Samsung on the other HDD players:

- HGST is generally perceived as a quality leader by most market participants.³⁴⁹
- The Commission's market investigation confirms that large OEMs tend to attach more importance to product quality than distributors.³⁵⁰ In fact, HDD suppliers see their presence and that of their competitors with the top PC OEMs as a relevant factor demonstrating the competitive strength of each HDD supplier. In particular, Samsung monitored its HDD competitors on the bases of the number of top 10 PC OEMs that they serve.³⁵¹ The share that the top 10 PC customers on the 3.5" Desktop market represent in HGST's overall sales on that market is relatively high, comparable to other tier 1 HDD competitors over the years, and has consistently been higher than that of Samsung.

(402) Indeed, HGST is considered by analysts as one of the three tier-one competitors on the HDD market alongside Seagate and WD.³⁵² [...]*.³⁵³

(403) Furthermore, suppliers in fixed-cost recovery industries such as HDD industry usually seek to recoup their fixed cost on the basis of their returns on their sales base. Large HDD competitors, like WD and Seagate, already recoup a significant part of their fixed cost from a large revenue base. As mentioned in Seagate's internal documents, HGST as a large, but smaller competitor to WD and to Seagate, has an incentive to grow and increase its market share:[This view is supported by the Parties' internal documents]*.³⁵⁴

(404) [...]*.³⁵⁵

(405) WD Public statements and [the Parties' internal documents]* confirm that HGST poses a particular price constraint on the 3.5" Desktop market:

*"As the small player, you can afford to bid aggressively to get an increasing share and either keep your volume constant or grow it, and get the benefit of that growth on your bottom line."*³⁵⁶

[the Parties' internal documents]*³⁵⁷

[the Parties' internal documents]*³⁵⁸

³⁴⁹ Customers reply to question 51 of the Commission's request for information of 19 April 2011.

³⁵⁰ Customers reply to the Commission's request for information of 22 June 2011, question 35.

³⁵¹ Samsung Annex 6.9 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, p. 11.

³⁵² Citi "Hard Disk Drives: Near Cycle Recovery; Initiating with Buys on STX and WDC", December 2010, p. 40

³⁵³ Samsung Annex 6.9 to the Form CO, "Mid/Long-Term Business Strategy (2010-2020)", Storage Division, May 2010, slides 6-7.

³⁵⁴ [...]*, Storage Device Industry – Competitive Analysis, Undated (approximately 1st Half of 2010).

³⁵⁵ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

³⁵⁶ WD earnings call, 21 July 2010.

³⁵⁷ [...]*

(406) It may be concluded that, although the market share of the merged entity and the increment that the proposed transaction brings about are significant, the merged entity will continue to face competition from two strong HDD suppliers, WD and HGST.

Merging firms are not close competitors

(407) The Commission's investigation has confirmed that Seagate and Samsung are not close competitors. On the contrary, Seagate, as a tier 1 supplier appears to compete more closely with WD and HGST rather than Samsung. In only very few instances (5 out of 28 products), respondents to the Commission's investigation referred to Samsung as the first or second alternative supplier of Seagate's products.³⁵⁹ According to one large OEM, "*Samsung tends to be a player to "fill the gap" for both for Desktop and Notebook HDDs*".³⁶⁰

(408) Bidding analysis can provide useful indications as to the closeness of competition between Seagate and Samsung, as it permits assessing how frequently Seagate and Samsung compete against each other for specific contracts. The Commission has analysed bidding data submitted by the Notifying Party, Samsung, WD and HGST. The data covered bids for a large number of 3.5" Desktop OEM customers that these four HDD competitors participated in since January 2010.

(409) This analysis showed that overall WD, Seagate and HGST took part in most of the bids for the selected customers whereas Samsung had the lowest participation rate. This is an indication that Samsung exerts a relatively weak competitive constraint on the other players. HGST was far more often present than Samsung, although these competitors have similar market shares.

(410) The finding is also consistent with the Parties' own bidding data analysis (carried out by the parties' economic advisers on a dataset of Seagate's bids). [...]*

(411) The Commission's analysis of the times that each of Seagate and Samsung has been first to the market with a HDD product at a higher storage capacity point on the 3.5" Desktop market shows that Seagate has been first-to-market far more often than Samsung. This data supports the finding that also on time-to-market and execution of product roadmaps, Samsung has not been a close competitor to Seagate.

(412) HDD suppliers' presence with the top PC OEMs is an indicator of their competitive strength. [This view is supported by the Parties' internal documents]*.³⁶¹

(413) Table 18 gives an overall view of the share that the top 10 PC OEMs represent in the respective overall sales of each of Seagate and Samsung:

³⁵⁸ [...]*

³⁵⁹ Customers' reply to the Commission's request for information of 19 April 2011, question 54.

³⁶⁰ Minutes of a telephone conference with a large PC OEM on 8 July 2011.

³⁶¹ Confidential Seagate Annex 31 to the Form CO, [Seagate internal documents]*.

	2007	2008	2009	2010
<i>Seagate</i>	[40-50]*%	[40-50]*%	[40-50]*%	[40-50]*%
<i>Samsung</i>	[20-30]*%	[20-30]*%	[10-20]*%	[10-20]*%

Table 18: Share of top 10 PC OEMs in overall sales of Seagate and Samsung

(414) The share that the top 10 PC customers on the 3.5" Desktop market represent in Seagate's overall sales on that market is relatively high. Moreover, it has over the years been comparable to other tier 1 HDD competitors. By contrast, the share that the top 10 PC customers on the 3.5" Desktop market represent in Samsung's overall sales remains much lower.

(415) It may be concluded that Seagate and Samsung are not particularly close competitors. Indeed, Western Digital and HGST appear to be closer competitors to Seagate than Samsung is.

Customers have possibilities of switching supplier

(416) A merger may affect customers' ability to protect themselves against price increases when these customers have difficulties switching to other suppliers because there are few alternative suppliers. Such customers are particularly vulnerable to price increases.³⁶²

(417) 17 out of the 19 3.5" Desktop HDDs customers which replied to the Commission's investigation indicated that three suppliers are sufficient to continue an effective multi-sourcing policy.³⁶³ A large OEM noted that having at least three strong suppliers is best for its higher volume main product lines. Another large OEM also indicated that three suppliers are needed for effective multi-sourcing strategy to mitigate supply risk and drive aggressive costs. Similarly, another OEM indicated that it would require at least 3 suppliers in the 3.5" Desktop market.³⁶⁴

(418) [This view is supported by documents from the Parties]*.³⁶⁵

(419) However, only a small minority of OEMs indicated that they need more than three qualified suppliers for their security of supply or to receive competitive outcomes in their purchase negotiations.³⁶⁶ As emerges from the market

³⁶² Horizontal Merger Guidelines, paragraph 31.

³⁶³ Customers reply to the Commission's request for information of 19 April 2011, question 65.

³⁶⁴ Customers reply to the Commission's request for information of 19 April 2011, question 65.

³⁶⁵ [Deposition of Seagate executive to the Federal Trade Commission]*.

³⁶⁶ Customers reply to the Commission's request for information of 19 April 2011, question 65. Only 3 out of 26 OEMs which responded to the market investigation indicated that they prefer four supplier for security of supply and competitive prices.

investigation³⁶⁷, in a three-supplier scenario, OEM customers have multiple ways to split their purchase shares across different HDD suppliers. They can, for instance, split the purchase shares 40/30/30 between three suppliers, or 50/40/10, or 60/20/20. Alternatively, they could split their purchase shares 60/40 between two HDD suppliers, but use the market presence of the third HDD supplier (its presence "on the shelf") as leverage to obtain competitive prices from the two suppliers that are selected. It is clear that in a three-supplier scenario, the potential purchase share differentials and hence the additional share that HDD competitors can compete for, can vary widely. In other words, the size of the contestable market can vary between a 0% purchase share (the OEM chooses two suppliers and the third supplier is put "on the shelf") and a 60-70% share (the maximum purchase share that most OEMs wish to allocate to an individual HDD supplier). In this regard, the entire market remains contestable.

(420) The market investigation confirmed that both WD and HGST are qualified as valid and reliable HDD suppliers by nearly all 3.5" HDD customers. Post-transaction, there will be besides the merged entity, WD and HGST and hence, three suppliers available for all the 3.5" HDD customers.

(421) Therefore, it can be concluded that post-merger customers, also in the most concentrated 3.5 HDD markets, will have the possibility to source from three competing HDD suppliers. In the light of the results of the Commission's investigation, the presence of three HDD suppliers will ensure sufficient possibilities for customers to multi-source and switch suppliers. This will ensure sufficient competition also in the most concentrated 3.5 HDD markets and prevent the merged entity from obtaining and exercising significant market power.

The merger does not eliminate an important competitive force

(422) As explained above, Samsung generally perceives itself and is perceived by a number of respondents to the market investigation and business analysts as a weak competitor. Indeed, Samsung is regarded as a second-tier player, whose lack of vertical integration translates into serious weaknesses in terms of cost competitiveness, difficulties to expand production capacity and weakness in the development of original technologies. Samsung has struggled with sustained deficits [as supported by documents from the Parties]*.

(423) It results from the first-phase investigation that the main PC OEMs purchase much less from Samsung compared to the other three main suppliers.³⁶⁸ The investigation also confirmed that Samsung is not generally perceived as a preferred supplier. The main reason put forward is quality. According to one OEM, "*Based on our previous experiences, our major concern would be quality.*" Another OEM indicated that it sources from Samsung only small volumes due to its relatively uncompetitive prices and quality. Another OEM also indicated that

³⁶⁷ Minutes of a meeting with a large PC OEM on 15 June 2011.

³⁶⁸ Customers reply to the Commission's request for information of 19 April 2011, questions 42 to 48 and 54.

*"In our estimation Samsung's experience in supporting OEM is relatively small".*³⁶⁹

- (424) OEMs and distributors active in the 3.5" Desktop market have confirmed that Samsung is not generally considered to be a cost leader. According to one OEM, a reason could be that *"Samsung has smaller quantities [of HDDs] than Seagate and WD therefore they might not be able to leverage of economies of scale"*. Another OEM indicated that *"Samsung has managed to gain market share and maintain its position for the past couple of years via offering aggressive pricing strategy. However, the fact that Samsung failed to manage its quality and delivery has yet drawn back the possibility of being the dominant player and left 10% market share only."*³⁷⁰
- (425) The Commission's investigation also indicates that the proposed transaction will not negatively impact on innovation in the 3.5" Desktop market.³⁷¹ Indeed, OEMs and distributors active in this market have not pointed to Samsung as a strong innovator. According to one OEM, Samsung is more a trend follower. Another OEM indicated that *"Samsung has tended to plan to be first to market on certain drives, but has not been successful in executing to plan."*³⁷² On the contrary, one customer notes in this regard that Samsung is *"not a quality, engineering, or technology leader"*.³⁷³
- (426) The finding is also consistent with the parties' analysis on innovation. Innovation is defined in the parties' analysis as the introduction of a new product, when a company starts selling a product that no other company has sold before. Products are defined in the parties' analysis on the basis of the combination of the key product features from a buyer perspective (form factor, capacity, speed). The parties' analysis suggests that Samsung was never the first to introduce a 3.5" HDD product in the last eleven years.
- (427) In sum, it may be concluded that Samsung does not constitute a particularly important competitive force before the proposed transaction. Consequently, the proposed transaction is unlikely to eliminate important competitive force on the 3.5 HDD markets.

Entry

- (428) The Commission has concluded that the proposed transaction is not likely to lead to anti-competitive effects in the worldwide market for 3.5" Desktop HDDs. However, the notifying party had submitted that even if the Commission were to find anti-competitive effects, entry would be a sufficient countervailing power to offset any anti-competitive effects of the proposed transaction. The Commission therefore investigated future entry into the 3.5 Desktop and CE HDD markets. In

³⁶⁹ Customers reply to the Commission's request for information of 22 June 2011, question 72.

³⁷⁰ Customers reply to the Commission's request for information of 22 June 2011, question 71.

³⁷¹ Customers reply to the Commission's request for information of 22 June 2011, question 73.

³⁷² Customers reply to the Commission's request for information of 19 April 2011, question 12.

³⁷³ Customers reply to the Commission's request for information of 22 June 2011, question 71.

light of the results of the Commission's investigation illustrated in section 5.3.2.2, the Commission concludes that significant entry into the 3.5" Desktop market appears unlikely in the near future. However, the Commission considers that this issue is not determinative for the purpose of assessing the proposed transaction.

Conclusion

(429) The merged entity will enjoy a substantial market share on the 3.5" Desktop HDD market. However, it will continue to face at least two strong competitors with significant market shares. Seagate and Samsung are not particularly close competitors before the proposed transaction. With three remaining suppliers, customers will retain sufficient possibilities to switch supplier and effectively multi-source. In case of a price increase, HGST and WD will most likely have the ability and the incentive to increase supply. Lastly, the merger does not eliminate a particularly important competitive force on the 3.5 HDD markets. It may therefore be concluded that the proposed transaction is unlikely to significantly impede effective competition on the worldwide market for 3.5" Desktop HDDs.

5.3.4. The market for 2.5" Mobile HDDs

5.3.4.1. Introduction

(430) *Market size.* The value of the worldwide 2.5" Mobile market amounted to approximately EUR 8 233 million in 2010. This market accounted for approximately 33% of the value of a worldwide overall HDD market in 2010.

(431) *Demand side.* The customers on the 2.5" Mobile market are generally OEMs and distributors. The former include for instance Acer, Apple, Asustek, Dell, HP, Lenovo, Medion AG, Positivo Informatica, and Sony. Distributors include for instance ABC Data, Avnet, Elko, Ingram Micro, Office May, Synnex, and Techdata. Moreover, non-integrated XHDD manufactures such Buffalo, Lacie, and Verbatim/ Freecom, also source 2.5" Mobile HDDs for inclusion into their external storage devices.

(432) *Supply side.* Currently, there are five suppliers active in the 2.5" Mobile market, notably: WD, Seagate, HGST, Toshiba and Samsung.

5.3.4.2. The Commission's assessment

Merging firms have limited market shares

(433) First, the proposed transaction would reduce the number of HDD competitors on the worldwide 2.5" Mobile market from five to four. Post merger, the Seagate/Samsung entity would hold a [30-40]*% market share (Seagate [10-20]*%; Samsung [10-20]*%). It would face WD ([20-30]*%), HGST ([20-30]*%) and Toshiba ([10-20]*%). While the merged entity would become the market leader, it will face a close runner-up, WD, as well as two further competitors, HGST and Toshiba, with sizeable positions in the market.

- (434) Second, a clear majority of PC OEM manufacturers sourcing, amongst others, 2.5" Mobile HDDs stated that they will "re-allocate" HDD purchase shares. One OEM specifically stated its intention to do so for 2.5" Mobile HDDs.³⁷⁴ The Commission's previous decisions in the HDD industry have recognised this so-called "Conner Effect".³⁷⁵ Accordingly, customers spread their sales over multiple suppliers, thus reducing the market share increment that a concentration between two HDD competitors brings about. In those previous cases, the Commission accepted that the "Conner effect" could mitigate the effects of transactions between two HDD competitors, as market share shifts were likely in light of the ability of customers to shift purchase shares and ultimately keep their total number of HDD suppliers constant.³⁷⁶
- (435) The Commission's investigation confirmed that the reduction of the number of HDD competitors from five to four is not likely to significantly reduce the ability of customers on that market to effectively multi-source their HDD supplies, given that the majority of OEM customers considers it important to be able to source from at least three suppliers. For these reasons, the market shares of HDD suppliers competing with the merged entity may benefit from the re-allocation of customers' shares after the proposed transaction.
- (436) In particular, the market investigation revealed that Toshiba is a strong competitor on the 2.5" Mobile HDD market. A number of customers outlined Toshiba's strength on that market. According to one respondent, Toshiba is "*ahead in development of new generation of mobile HDDs SATA*"; another respondent put forward Toshiba's "*good pricing and quality on consumer mobile drives*." Moreover, respondents to the market investigation confirmed that Toshiba was a reliable supplier of 2.5" Mobile HDDs. HGST also emerged as a strong competitor. According to a large OEM, HGST has a "*strong product lineup in Mobile*"; another respondent considers that the "*main strength of Hitachi is they have a technology lead in 7mm slim mobile HDDs*".³⁷⁷
- (437) Fourth, the historic development of market shares both in revenue and volume, as depicted in Table 19 and Table 20 demonstrates that Samsung has consistently been the smallest competitor in 2.5" Mobile market over the past four years (2007-2010).

³⁷⁴ Customers reply (PC OEMs) to the Commission's request for information of 22 June 2011, question 46 and 46.1.

³⁷⁵ See for example Case COMP/M.5483 – *Toshiba/Fujitsu HDD Business*, Commission Decision of 11 May 2009, paragraph 33.

³⁷⁶ See for example Case COMP/M.5483 – *Toshiba/Fujitsu HDD business*, Commission Decision of 11 May 2009, paragraph 33, and footnote 6.

³⁷⁷ Customers reply to the Commission's request for information of 19 April 2011, question 51.

	2006	2007	2008	2009	2010
Seagate	[10-20]*%	[10-20]*%	[10-20]*%	[20-30]*%	[10-20]*%
Samsung	[5-10]*%	[5-10]*%	[5-10]*%	[10-20]*%	[10-20]*%
COMBINED	<i>[20-30]*%</i>	<i>[20-30]*%</i>	<i>[20-30]*%</i>	<i>[30-40]*%</i>	<i>[30-40]*%</i>
WD	[5-10]*%	[10-20]*%	[20-30]*%	[20-30]*%	[20-30]*%
HGST	[20-30]*%	[20-30]*%	[20-30]*%	[10-20]*%	[20-30]*%
Toshiba	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%
Others	[20-30]*%	[10-20]*%	[10-20]*%	[5-10]*%	[0-5]*%

Table 19: Worldwide market shares for 2.5" Mobile Drives 2006-2010 (in value)

	2006	2007	2008	2009	2010
Seagate		[10-20]*%	[10-20]*%	[20-30]*%	[20-30]*%
Samsung		[5-10]*%	[5-10]*%	[5-10]*%	[10-20]*%
COMBINED		[20-30]*%	[20-30]*%	[30-40]*%	[30-40]*%
WD		[10-20]*%	[20-30]*%	[20-30]*%	[30-40]*%
HGST		[20-30]*%	[20-30]*%	[10-20]*%	[20-30]*%
Toshiba		[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%
Others		[10-20]*%	[10-20]*%	[5-10]*%	[0-5]*%

Table 20: Worldwide market shares for 2.5" Mobile Drives 2006-2010 (in volume)

(438) The tables show that WD became the market leader in 2008, with Seagate, HGST and Toshiba (acquired Fujitsu's HDD Business in 2009) competing for the second position. While Samsung has been able to grow market share (in volume) from [5-10]*% (2007) to [10-20]*% (in 2010), it clearly has been the smallest competitor throughout all of this period. Therefore, the change brought about by the proposed transaction is therefore likely to be limited.

Merging firms are not close competitors

(439) As explained in Section 5.3.2.3, Samsung generally perceives itself and is perceived by customers and business analysts as a second-tier competitor. Samsung is perceived as a competitor, whose lack of vertical integration translates into weaknesses in terms of cost competitiveness, difficulties to expand production capacity and the development of original technologies.

(440) The Commission's investigation has confirmed that Seagate and Samsung are not close competitors. On the contrary, Seagate, as a tier 1 supplier appears to compete more closely, at the minimum, with WD and HGST. In only a few instances (8 out of 29 products), respondents to the Commission's first phase market investigation referred to Samsung as the first or second alternative supplier of Seagate's products.³⁷⁸ According to one large OEM, "*Samsung tends to be a player to "fill the gap" for both for Desktop and Notebook HDDs*".³⁷⁹

³⁷⁸ Customers replies to the Commission's request for information of 19 April 2011, question 54.

³⁷⁹ Minutes of a telephone conference with a large PC OEM on 8 July 2011.

(441) This conclusion is confirmed by the Commission's descriptive analysis of the bidding data submitted by Seagate, Samsung, WD and HGST in relation to the 2.5" Mobile market. The results show that the four companies overall participated to large percentages of the bids. Samsung, however, had not only the lowest, but also a significantly lower, participation rate than the other three companies that submitted bidding data. This is an indication that Samsung exerts a relatively weak competitive constraint on these other players. It should be noted that due to a lack of data from Toshiba, this analysis does not take into account the competitive constraints exercised by Toshiba as the fourth largest competitor in the 2.5" Mobile market in 2010.

(442) As regards Seagate's and Samsung's sales to the top Notebook OEMs, which can be considered as an indicator of their competitive strength, the table below gives an overall view of the share that the top 10 PC OEMs represent in the respective overall sales of both Seagate and Samsung:

	2007	2008	2009	2010
<i>Seagate</i>	[70-80]*%	[60-70]*%	[60-70]*%	[60-70]*%
<i>Samsung</i>	[50-60]*%	[40-50]*%	[20-30]*%	[20-30]*%

Table 21: Share of top 10 OEMs in Seagate and Samsung's overall sales

(443) Table 21 demonstrates that the share that the top 10 Notebook customers on the 2.5" Mobile market represent in Seagate's overall sales on that market is relatively high. Moreover, it has over the years been comparable to other tier 1 HDD competitors. By contrast, the share that the top 10 PC customers on the 2.5" Mobile market represent in Samsung's overall sales remains much lower and has constantly decreased since 2007.

(444) In light of the above arguments, it may be concluded that Seagate and Samsung are not particularly close competitors in the worldwide market for 2.5 Mobile HDDs.

Customers continue to have the possibility to switch supplier

(445) 17 out of 19 customers respondent to the Commission's investigation indicated that three suppliers are sufficient to continue an effective multi-sourcing policy.³⁸⁰

(446) After the proposed transaction, there will be four independent suppliers left in the 2.5" Mobile market. Therefore, it may be concluded that customers will continue to have the possibility to effectively multisource from, and/or to switch, HDD suppliers.

³⁸⁰ Customers reply to the Commission's request for information of 19 April 2011, question 65.

Merger does not eliminate an important competitive force

- (447) Many of the respondents to the Commission's investigation indicated that they do not source from Samsung.³⁸¹ The market investigation also indicated that Samsung is not generally perceived as a preferred supplier. The Commission's investigation was not conclusive as to the question whether Samsung is considered to be a cost leader by those customers sourcing 2.5" Mobile HDDs.³⁸² One large OEM considering Samsung a cost-leader notes that Samsung "is usually close to market price". Another one believes that Samsung competes largely on price in the market, but that it is "not a quality, engineering, or technology leader". Three other PC OEMs also noted quality concerns with regard to Samsung.³⁸³ Other OEMs who do not consider Samsung to be a cost-leader note that "*Samsung is generally viewed as having comparatively high prices*", that it "*might not be able to leverage economies of scale*", and that it is a "*cost-follower*".³⁸⁴
- (448) Second, the Commission's investigation indicates that the proposed transaction will not negatively impact innovation in this market. Indeed, the market investigation has indicated that Samsung is not a strong innovator in 2.5" Mobile HDDs. The Commission's analysis of product introductions of Western Digital, HGST Seagate, and Samsung shows that Samsung has been first-to-market with only a very limited number of capacity-improved 2.5 Mobile HDD products. While the Commission does not have systematic data on Toshiba's capacity-improved HDDs that were first-to-market, a number of such innovations may be noted since Toshiba introduced the world's first 2.5" SATA HDD in 2003.³⁸⁵ Also, some customers mention Toshiba as an innovator in 2.5" Mobile HDDs.³⁸⁶ Conversely, not a single customer has quoted Samsung as one of the two main innovators in the 2.5" Mobile market – the only HDD supplier not noted for being an innovator in 2.5" Mobile.³⁸⁷ On the contrary, a significant PC OEM customer notes in general terms that Samsung is "not a quality, engineering, or technology leader".³⁸⁸
- (449) Thirdly, although Samsung has had some success in offering 2.5" HDDs in comparison with its other HDD offering, with a [10-20]*% share in volume it has remained the weakest competitor among vendors that produce 2.5" Mobile drives. One reason for this weakness is Samsung's lack of vertical integration upstream into key components, as described in detail in section 5.3.2.3. Therefore,

³⁸¹ Customers reply to the Commission's request for information of 19 April 2011 questions 41 to 48 and 54.

³⁸² Customers reply to the Commission's request for information of 22 June 2011, question 71.

³⁸³ Customers reply to the Commission's request for information of 22 June 2011, question 72.

³⁸⁴ Customers reply to the Commission's request for information of 22 June 2011 question 71..

³⁸⁵ In March 2010, Toshiba introduced 750 GB and 1 TB 2.5" HDDs with 5400 RPM. In 2008, it launched the highest capacity 2.5" HDD of 400 GB. In 2006 Toshiba first introduced the 200 GB 2.5" 5400 RPM HDD. In 2003, Toshiba introduced the world's first 2.5" SATA HDD. (Annex 10 to the Notifying Party's reply to the Commission's Article 6(1)(c) Decision of 30 May 2011).

³⁸⁶ Customers reply to the Commission's request for information of 22 June 2011, question 73.

³⁸⁷ Customers reply to the Commission's request for information, question 73.

³⁸⁸ Customers (PC OEMs) reply to the Commission's request for information of 22 June 2011, question 71.1.

Samsung (along with Toshiba) is generally regarded as a second-tier competitor.³⁸⁹

- (450) In comparison, both WD and HGST are vertically integrated upstream and enjoy competitive strength, a fact that is also reflected in their market shares of [20-30]*% and [20-30]*% respectively. Along with Seagate, customers have mentioned these two companies most often as being a main innovator in 2.5" Mobile HDDs.³⁹⁰
- (451) The fourth player, Toshiba was until recently always smaller than WD and HGST but always a bit stronger than Samsung in the 2.5" Mobile HDD market. Some OEMs replying to the market investigation noted its strategic focus on 2.5" Mobile HDDs (as well as smaller form factors). For instance, one large OEM having a long relationship with Toshiba states that it has "proven to be a reliable supplier of 2.5 inch HDDs". Two other significant PC OEMs indicated that Toshiba's strength results from its strong Mission Critical Enterprise and Notebook products.³⁹¹
- (452) However, customers also noted recent performance issues with regard to Toshiba. When it bought Fujitsu's HDD business in 2009, its market share in 2.5" Mobile should have increased from [10-20]*% in 2008 to well over [20-30]*%. However, customers mention both, integration issues between the two businesses, as well as OEMs' re-allocation of shares following that transaction ("Conner-effect"), to explain that Toshiba's market share increased only slightly to [10-20]*% in 2010.³⁹²[reference to the Parties' internal documents]*.³⁹³ At least one large OEM also indicated that it will shift business to Toshiba for 2.5" HDDs.³⁹⁴ It may be expected that Toshiba will constrain its competitors in this market.
- (453) For the above reasons, it may be concluded that removing Samsung is not likely to eliminate a particularly important competitive force in the worldwide market for 2.5" Mobile HDDs.
- (454) In light of the above, it may be concluded that the proposed transaction does not give rise to significant impediment of effective competition stemming from non-coordinated effects in the 2.5" Mobile market.

³⁸⁹ Citi "Hard Disk Drives: Near Cycle Recovery; Initiating with Buys on STX and WDC", December 2010, p. 40: *"The top 3 players (Western Digital, Seagate, Hitachi) all have vertically integrated manufacturing, and essentially control the market with a combined 79% market share. Meanwhile, Toshiba and Samsung are considered relatively marginal players, whose commitment to the HDD business continues to be questioned given their heavy dependence on merchant vendors for critical components. Both Toshiba and Samsung have struggled to move beyond 10-11% market share during the past 5 years."*

³⁹⁰ Customers reply to the Commission's request for information of 22 June 2011, question 73.

³⁹¹ Customers reply to the Commission's request for information of 20 April 2011, question 51.

³⁹² Customers' reply to the Commission's request for information of 22 June 2011, question 49.

³⁹³ [Deposition of Seagate executive to the Federal Trade Commission]*

³⁹⁴ Customers reply (one PC OEM) to the Commission's request for information of 22 June 2011.

5.3.5. The market for 3.5" Business Critical Enterprise HDDs

5.3.5.1 Introduction

(455) *Market size.* According to the Notifying Party, the value of the worldwide 3.5" Business Critical Enterprise HDD market amounted to EUR 1.6 billion in 2010. On the basis of the market size estimates provided by the Notifying Party, this market accounted for approximately 7% of the value of a worldwide overall HDD market.

(456) *Demand side.* The customers on the 3.5" Business Critical Enterprise market are generally OEMs. End customers for Business Critical HDDs include Google and Facebook, who use these HDDs in their large storage or server farms.

(457) *Supply side.* There are currently five suppliers on the 3.5" Business Critical Enterprise market: Seagate, WD, HGST, Samsung and Toshiba.³⁹⁵

5.3.5.2. The Commission's assessment

The proposed transaction results in an insignificant increment in market share and a minimal change in the concentration level in the market

	2008	2009	2010
SEAGATE	[50-60]*%	[40-50]*%	[30-40]*%
SAMSUNG	[0-5]*%	[0-5]*%	[0-5]*%
COMBINED	[50-60]*%	[40-50]*%	[40-50]*%
WD	[10-20]*%	[30-40]*%	[30-40]*%
HGST	[20-30]*%	[10-20]*%	[20-30]*%
Toshiba ³⁹⁶	-	-	-

Table 22: Worldwide market shares 2008-2010 (in value)

Source: Notifying Party's estimates³⁹⁷

(458) The proposed transaction will only result in a negligible increment of [0-5]*% to Seagate's market share ([30-40]*%).

(459) Samsung has been present in the 3.5" Business Critical market for some years but it has failed to gain and maintain a significant market share. On the contrary, Samsung's already small market share in 2008 has decreased even further to [0-5]*% in 2010. The information provided by the Notifying Party indicates that

³⁹⁵ Toshiba announced a 3.5" Business Critical Enterprise HDD offering in December 2010.

³⁹⁶ Toshiba currently has a negligible share (below [0-5]*%) of this market.

³⁹⁷ Figures are rounded off.

Samsung currently supplies its Business Critical Enterprise HDDs to only [...]***³⁹⁸ and, indeed, only one OEM responding to the market investigation reported that it has qualified Samsung's 3.5" Business Critical Enterprise HDD.³⁹⁹

(460) The Commission's investigation examined how Samsung's 3.5" Business Critical Enterprise HDDs compare in terms of characteristics, innovative qualities and capabilities in relation to 3.5" Business Critical HDDs offered by the other HDD suppliers. The market investigation also examined whether Samsung is perceived by OEMs as currently exercising an important competitive constraint in relation to the 3.5" Business Critical Enterprise. The investigation also examined whether, absent the proposed transaction, OEMs expect Samsung to develop into a sufficiently constraining influence on the 3.5" Business Critical Enterprise market over the next 3 years.

(461) The market investigation indicated that the vast majority of OEMs have not qualified Samsung's products.⁴⁰⁰ Indeed, only one customer indicated that it has qualified Samsung's 3.5" Business Critical Enterprise HDD and it is only this customer which observed that Samsung is already an effective competitor on the 3.5" Business Critical Enterprise market.⁴⁰¹

(462) One significant OEM noted that it was not even aware of the existence of Samsung's 3.5" Business Critical products.⁴⁰² Another OEM explained that the reason behind its decision not to qualify Samsung's 3.5" Business Critical Enterprise HDD product is that it does not consider Samsung as a viable supplier of such HDDs.⁴⁰³

(463) As observed by two OEMs, Samsung's lack of scale in this market poses higher production costs and operating expenses.⁴⁰⁴ One of these OEMs observes that this lack of critical mass that has prevented Samsung from investing in critical head and media technology needed for future products at the rate of its competitors.⁴⁰⁵ Indeed, one OEM submitted that Samsung's 3.5" Business Critical Enterprise HDD quality is currently inferior to that of other suppliers.⁴⁰⁶ In addition, another OEM observed that points to Samsung's lack of experience in relation to Enterprise HDDs⁴⁰⁷ as a strategic weakness.⁴⁰⁸

³⁹⁸ Form CO, p. 39.

³⁹⁹ Customers reply (one OEM) to the Commission's request for information of 22 June 2011, question 64.

⁴⁰⁰ Customers reply of customers to the Commission's request for information of 22 June 2011, question 64.1.

⁴⁰¹ Customers reply (one OEM) to the Commission's request for information of 22 June 2011, question 64.4.1.

⁴⁰² Customers reply (one OEM) to the Commission's request for information of 22 June 2011, question 62.

⁴⁰³ Customers reply (one OEM) to the Commission's request for information of 22 June 2011, question 64.4.1.

⁴⁰⁴ Customers reply (one OEM) to the Commission's request for information of 22 June 2011, question 64 and 64.4.1.

⁴⁰⁵ Customers reply (one OEM) to the the Commission's request for information of 22 June 2011, question 64.4.1.

⁴⁰⁶ Customers reply (one OEM) to the the Commission's request for information of 22 June 2011, question 64.4.1.

⁴⁰⁷ Samsung is not present in the Mission Critical Enterprise market.

⁴⁰⁸ Cisco reply to the the Commission's request for information of 21 June 2011, question 64.4.

(464) Moreover, none of the respondents to the market investigation have indicated Samsung as an important innovator in relation to Business Critical Enterprise HDDs.⁴⁰⁹

(465) In light of the above, the Commission's investigation indicated that Samsung does not currently exercise a significant competitive constraint in the worldwide market for 3.5" Business Critical Enterprise HDDs.

(466) Furthermore, as regards a more dynamic assessment of Samsung's role in the competitive interplay between market players within the next three years, the market investigation indicated that the majority of respondents (26 out of 39) do not consider that, absent the proposed transaction, Samsung would develop into a significant competitive constraint on the 3.5" Business Critical Enterprise market.⁴¹⁰ Indeed, the vast majority of OEMs do not even plan to qualify Samsung's 3.5" Business Critical HDD.⁴¹¹

Merging firms are not close competitors

(467) As explained, Samsung generally perceives itself and is perceived by a number of respondents to the market investigation and business analysts as a weak competitor. Indeed, unlike Seagate (which holds a market share of [30-40]*%) Samsung (which holds a market share of [0-5]*%) is regarded as a second-tier player, whose lack of vertical integration translates into serious weaknesses in terms of cost competitiveness, difficulties to expand production capacity and weakness in the development of original technologies. Samsung has struggled with sustained deficits [...]*.⁴¹²

(468) Its negligible market share reflects that fact that OEMs purchase much less from Samsung as compared to the other three main suppliers. Unlike Seagate (with a market share of [30-40]*%), Samsung is not currently exercise a significant competitive constraint in the 3.5" Business Critical Enterprise market. Furthermore, whilst Seagate is unanimously indicated by OEMs as an important Enterprise HDD innovator, none of the respondents to the market investigation have cited Samsung as being an important innovator.⁴¹³

Customers have possibilities of switching supplier

(469) Besides the merged Seagate/Samsung entity, viable suppliers, WD (with a market share of [30-40]*%) and HGST (with a market share of [20-30]*%), would remain in the 3.5" Business Critical Enterprise HDD market post merger. Although Toshiba recently entered the 3.5" Business Critical Enterprise HDD market, the Commission's market investigation indicated that OEMs do not

⁴⁰⁹ Customers reply to the Commission's request for information of 22 June 2011, question 73.

⁴¹⁰ Customers reply to the Commission's request for information of 22 June 2011, question 64.4.

⁴¹¹ Customers reply to the Commission's request for information of 22 June 2011, question 64.2.

⁴¹² See Annex 8 of the Notifying Party's reply to the Article 6(1)(c) Decision of 30 May 2011, pp. 4 and 5.

⁴¹³ Customers reply to the Commission's request for information of 22 June 2011, question 73.

perceive Toshiba as currently exercising an important constraining influence in the 3.5" Business Critical Enterprise HDD market.⁴¹⁴

(470) In the post-merger scenario, OEM customers would continue to have multiple ways to split their purchase shares across different HDD suppliers. The potential purchase share differentials and hence the additional share that HDD competitors can compete for, can vary widely. Consequently, even in light of the multi-sourcing patterns prevalent in this market, the contestable market will not be significantly reduced by the proposed transaction.

(471) In light of the above, it may be concluded that customers will continue to have sufficient possibilities of multi-sourcing and switching supplier post merger and thereby ensure effective competition on the worldwide market for 3.5 Business Critical Enterprise HDDs.

Merger does not eliminate an important competitive force

(472) The proposed transaction eliminates a market player which has failed to gain and maintain significant market share and that has instead lost market share to come to hold a very low ([0-5]*%) share of the market. Post-merger, the merged entity will continue to face competitive constraints from WD and HGST.⁴¹⁵

(473) As already indicated in Recitals (459) to (463), the Commission's investigation has indicated that Samsung does not constitute a particularly important competitive force before the proposed transaction. Consequently, the proposed transaction is unlikely to eliminate an important competitive force on the worldwide market for 3.5 Business Critical Enterprise HDDs.

(474) Furthermore, as regards a more dynamic assessment of Samsung's role in the competitive interplay between suppliers within the next three years, the market investigation indicated that the majority of OEMs do not consider that, in the absence of the proposed transaction, Samsung would develop into a sufficiently constraining influence on the 3.5" Business Critical Enterprise market.⁴¹⁶ Indeed, the vast majority of OEMs do not even plan to qualify Samsung's 3.5" Business Critical HDD.⁴¹⁷

(475) The proposed transaction will only result in a negligible increment in market share post-merger. Samsung does not currently exercise a significant competitive constraint in the 3.5" Business Critical Enterprise HDD market and OEMs do not

⁴¹⁴ Toshiba has only recently entered the 3.5" Business Critical Enterprise market. Customers reply to the Commission's request for information of 22 June 2011, question 62, indicates that OEMs do not perceive Toshiba as currently exercising an important constraining influence in the 3.5" Business Critical Enterprise market.

⁴¹⁵ Toshiba has only recently entered the 3.5" Business Critical Enterprise market. Customers reply to the Commission's request for information of 22 June 2011, Question 62, indicates that OEMs do not perceive Toshiba as currently exercising an important constraining influence in the 3.5" Business Critical Enterprise market.

⁴¹⁶ Customers reply to the Commission's request for information of 22 June 2011, question 64.4.

⁴¹⁷ Customers reply to the Commission's request for information of 22 June 2011, question 64.2.

consider that, absent the proposed transaction, Samsung would develop into a significant competitive constraint on the 3.5" Business Critical Enterprise HDD market. The parties are not particularly close competitors. Furthermore, post-merger, the merged entity will continue to face two strong competitors, and sufficient possibilities of effective multi-sourcing and switching supplier will exist for customers.

(476) It may be concluded that the proposed transaction is not likely to significantly impede effective competition on the worldwide market for 3.5" Business Critical Enterprise HDDs.

5.3.6. The market for 3.5" CE HDDs

5.3.6.1. Introduction

(477) *Market size.* The value of the worldwide 3.5" CE market amounted to approximately EUR 1.3 billion in 2010. This market accounted for approximately 6% of the value of a worldwide overall HDD market in 2010.

(478) *Demand side.* The customers on the 3.5" CE market are generally OEMs.

(479) *Supply side.* There are currently four suppliers on the 3.5" CE market: Seagate, WD, HGST and Samsung.

5.3.6.2. The Commission's assessment

The proposed transaction results in an insignificant increment in market share

	2006	2007	2008	2009	2010
Seagate	[30-40]*%	[40-50]*%	[40-50]*%	[40-50]*%	[40-50]*%
Samsung	[5-10]*%	[5-10]*%	[0-5]*%	[0-5]*%	[0-5]*%
COMBINED	[40-50]*%	[50-60]*%	[40-50]*%	[40-50]*%	[40-50]*%
WD	[30-40]*%	[30-40]*%	[40-50]*%	[30-40]*%	[40-50]*%
HGST	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%	[10-20]*%
Others	[5-10]*%	[0-5]*%	[0-5]*%	[0-5]*%	[0-5]*%

Table 23: Worldwide market shares 2006-2010 (in value)

Source: Notifying Party's estimates⁴¹⁸

(480) Although currently Seagate is the market leader in the 3.5" CE market with a [40-50]*% market share, the proposed transaction will only result in a negligible increment of [0-5]*% to Seagate's market share.

⁴¹⁸ Figures are rounded off.

(481) In light of Samsung's minimal market share, the loss of competitive pressure in the market resulting from the removal of Samsung will not be significant. Indeed, Samsung currently holds a market share of [0-5]*%. Furthermore, its market share over the period 2006-2010 has dwindled, falling from [5-10]*% in 2006 to [0-5]*% in 2010. This constant reduction in market share reflects the diminishing and presently minimal constraining influence exercised by Samsung in the worldwide market for 3.5" CE HDDs.

Merging firms are not close competitors

(482) Samsung generally perceives itself and is perceived by a number of respondents to the market investigation and business analysts as a weak competitor. Indeed, unlike Seagate (which holds a market share of [40-50]*%) Samsung (which holds a market share of [0-5]*%) is regarded as a very small second-tier player, whose lack of vertical integration translates into serious weaknesses in terms of cost competitiveness, difficulties to expand production capacity and weakness in the development of original technologies. Samsung has struggled with sustained deficits [...]*.⁴¹⁹

(483) Samsung's insignificant market share reflects the fact that OEMs purchase much less from Samsung as compared to the other three main suppliers. Furthermore, whilst Seagate is indicated as an important innovator by a majority of 3.5" CE customers, only one such customer cited Samsung as being an important innovator.⁴²⁰

Customers have possibilities of switching supplier

(484) As explained in Recitals (327) to (329) in this decision in the context of the assessment of other HDD markets, the Commission's investigation confirmed that OEMs typically multisource from the different HDD suppliers. OEMs then generally award their actual HDD purchases between two and four suppliers in any given market.⁴²¹ The investigation indicated that OEMs engage in multi-sourcing strategies mainly in order to ensure security of supply in the desired quality.⁴²²

(485) Besides the merged Seagate/Samsung entity, WD and HGST will remain on the worldwide market for 3.5" CE HDDs after the proposed transaction. In the post-merger scenario, OEM customers would continue to have multiple ways to split their purchase shares across the three different HDD suppliers. The potential purchase share differentials and hence the additional share that HDD competitors can compete for, can vary widely. Consequently, even in light of the multi-sourcing patterns prevalent in this market, the contestable market would not be significantly reduced by the proposed transaction.

⁴¹⁹ See Annex 8 of the Notifying Party's reply to the Article 6(1)(c) Decision of 30 May 2011, pp. 4 and 5.

⁴²⁰ Customers reply to the Commission's request for information of 22 June 2011, question 73.

⁴²¹ Customers reply to the Commission's request for information of 19 April 2011, question 33.

⁴²² Customers reply to the Commission's request for information of 19 April 2011, question 36.

(486) In light of the above, it may be concluded that customers will continue to have sufficient possibilities of multi-sourcing and switching supplier post merger and thereby ensure effective competition on the worldwide market for 3.5 CE HDDs.

Merger does not eliminate an important competitive force

(487) The proposed transaction eliminates a market player, whose market share over the period 2006-2010 has dwindled, falling from [5-10]*% in 2006 to [0-5]*% in 2010. This constant reduction in market share reflects the diminishing and presently insignificant constraining influence exercised by Samsung in the 3.5" CE HDD market. On the other hand, the merged entity will continue to face competitive constraints from WD, which currently holds a market share of [40-50]*% and HGST, which currently holds a market share of [10-20]*%, after the merger.⁴²³ Furthermore, the Commission's market investigation did not reveal any indication that Samsung would be an important competitive force on the worldwide market for 3.5" CE HDDs.

(488) In light of the results of the Commission's investigation, it may be concluded that Samsung does not constitute a particularly important competitive force before the proposed transaction. Consequently, the proposed transaction is unlikely to eliminate an important competitive force on the worldwide market for 3.5 CE HDDs.

(489) The Commission has concluded that the proposed transaction is not likely to lead to anti-competitive effects in the worldwide market for 3.5" CE HDDs. However, the notifying party had submitted that even if the Commission were to find anti-competitive effects, entry would be a sufficient countervailing power to offset any anti-competitive effects of the proposed transaction. The Commission therefore investigated future entry into the HDD industry in general and the 3.5 CE HDD market in particular. In light of the results of the Commission's investigation illustrated in section 5.3.2.2, the Commission concludes that significant entry into the 3.5" CE market appears unlikely in the near future. However, the Commission considers that this issue is not determinative for the purpose of assessing the proposed transaction.

(490) The proposed transaction will only result in a negligible increment in market share. Samsung's market share has dwindled over time and it does not currently exercise a significant competitive constraint in the worldwide market for 3.5" CE HDDs. The parties are not particularly close competitors. Furthermore, post-merger, the merged entity will continue to face two strong competitors and sufficient possibilities of effective multi-sourcing and switching supplier will exist for customers.

⁴²³ Toshiba has only recently entered the 3.5" Business Critical Enterprise market. Customers reply to the Commission's request for information of 22 June 2011, question 62, indicates that OEMs do not perceive Toshiba as currently exercising an important constraining influence in the 3.5" Business Critical Enterprise market.

(491) It may be concluded that the proposed transaction is not likely to significantly impede effective competition on the worldwide market for 3.5" CE HDDs.

5.3.7. The XHDDs market

(492) The EEA market is an important market for XHDDs. More than one third of the EUR 5.6 billion total worldwide XHDD turnover is achieved in the EEA.

Demand Side

(493) The XHDD market is growing fast, in fact, faster than the HDD markets. In 2010, the total XHDD market accounted for approximately EUR 2 billion in the EEA. Between 2006 and 2010, the total market size in volume more than doubled.

(494) The demand side seems to be fragmented in the EEA. The broad majority of XHDD turnover of the Parties sales in 2010 were achieved with wholesalers and distributors. The sales of the Parties indicate that customers tend to purchase lower volumes per customer compared to the major OEMs in the upstream HDD markets.

(495) Distributors and wholesalers sell mostly to retailers (such as computer superstores, warehouse clubs, online retailers and computer electronic stores). The final customers of XHDD are end-consumers or small- and medium-sized businesses.

Supply Side

(496) On the supply side, the XHDD market seems to be, at first glance, less concentrated than the markets for HDDs. In addition to the HDD producers (namely WD, HGST, Seagate, Samsung and Toshiba), there are alternative XHDD suppliers such as LaCie, Verbatim, Buffalo and Iomega ("non-integrated suppliers"). These are not vertically-integrated into the upstream manufacturing of HDDs. Basically all significant XHDD manufacturers supply the full range of different XHDDs types.

(497) The XHDD market was first developed by non-integrated suppliers.⁴²⁴ In the last years, the HDD manufacturers have entered the downstream XHDD market. From 2000 on, they were able to gain significant market shares to the relative detriment of non-integrated suppliers.

(498) Since 2008, all vertically-integrated HDD manufacturers have been active in the downstream market for XHDDs worldwide and to different extent also in the EEA. WD, Seagate and Samsung are the leading companies in the XHDD market worldwide and in the EEA.

(499) Seagate started supplying XHDDs in 2004, strengthening its product offering in 2005 and 2006 considerably following its acquisitions of Mirra and Maxtor.

⁴²⁴ Also called "External Box Builder".

Seagate sells a broad range of XHDD products, in a variety of capacities and form factors aiming at all different end-customer level. Seagate's XHDD products are mainly marketed under three sub-brands: Expansion, BlackArmor and GoFlex. On the 19 April, Seagate announced to acquire the HDD and XHDD business of Samsung.

- (500) Samsung commenced its XHDD business at the end of 2008. Samsung sells its XHDDs under the Samsung brand as well as under a number of sub-brands. In relation to XHDDs, Samsung provides a varied range of solutions, offering a wide choice of capacity, speed, and portable size (including 1.8", 2.5" and 3.5"). It uses its own HDDs as an input for its XHDDs. It has also developed a specific 2.5" USB-on-board HDD which can only be used in XHDDs. Samsung has managed to establish itself as a sizeable XHDD supplier at an EEA and worldwide level within a short period of time.
- (501) WD has been active as an XHDD supplier since 2000 when it launched its first XHDD product. WD has become the leading XHDD supplier worldwide and in the EEA. WD sells its XHDDs under its brand Western Digital and under the "HP" brand which it licensed from HP for this specific purpose. WD uses contract manufacturers for the production of XHDDs.
- (502) HGST entered the market for branded XHDDs in 2009 with the acquisition of the company Fabrik which had just shortly before acquired Simple Tech, a company selling branded XHDDs. HGST currently sells its branded XHDDs under its Hitachi brand as well as under an number of sub-brands such as G-Technology, Touro, Lifestudio and SimpleTech. The G-Technology brand is specialized in XHDDs for Apple end-customers.
- (503) Toshiba is also a recent entrant. It started supplying XHDDs in 2006. It entered the market mainly with 2.5" XHDDs for which it is able to produce the HDD input itself. However, Toshiba also supplies 3.5" XHDDs for which it procures its HDD input from other HDD manufacturers.
- (504) There are a number of non-integrated suppliers like Iomega, LaCie, Verbatim/Freecom, and Buffalo. Some market players mainly focus on a specific region like Buffalo and IO Data which are mainly active in Japan and other Asian countries. Buffalo has only a small presence in the EEA while IO Data does not seem to be active in the EEA pursuant to the market data provided by the Notifying Party.
- (505) Iomega, a wholly-owned subsidiary of EMC Corporation headquartered in San Diego, is active in innovative storage and network security solutions for small businesses, home offices, consumers and others. EMC Corporation is a worldwide USD 17 billion group focused on information infrastructure.
- (506) LaCie is one of the pioneers in the XHDD market and was one of the first suppliers of XHDDs. It tries to differentiate itself through innovation, design and now embedded cloud storage. LaCie is today active worldwide.

- (507) Verbatim is the data storage technology division of Mitsubishi Chemical Holding Corporation. In 2009, it also acquired Freecom, another XHDD supplier. Verbatim is positioned as a brand for the retail channel while Freecom is positioned as a professional specialist brand, primarily selling to resellers and Apple specialists.
- (508) Buffalo is a global manufacturer of storage, multimedia, and wireless networking products for the home and small businesses. Buffalo is part of the worldwide USD 1.3 billion Melco Holdings Inc. group of companies ("Melco") which are involved in the manufacture of numerous access memory products, Flash memory products, USB products, CD-ROM/DVD-RW drives, hard disks, local area network products, printer buffers, liquid crystal displays, Microsoft Windows accelerators, Personal computer components and CPU accelerators.
- (509) There have been a high number of other non-vertically integrated XHDD suppliers in the past which have either exited the market or, like Maxtor, Freecom or SimpleTech, have been bought by other companies.

The impact of the proposed transaction on the market for XHDDs in the EEA

The merger will not lead to significant non-coordinated effects

- (510) The Commission's investigation indicated that the proposed transaction will not lead to any significant non-coordinated effects in the EEA market for XHDDs.
- (511) First, even after the notified transaction, WD will still be the market leader. The acquisition of Samsung which is currently the number sixth largest supplier in the market would not considerably increase Seagate's market position. It would remain the number two player behind Western Digital which will still have a market share more than 50% larger than the merged entity.
- (512) Second, the post-merger market share of below 25% presumes that the merger will not lead to significant non-coordinated effects in the XHDD market in the EEA.⁴²⁵
- (513) Third, even if, as the market investigation indicated, the EEA market has to be assessed from a dynamic perspective as the entry and expansion of HDD manufacturers in the XHDD market is currently rapidly changing the competitive landscape, mirroring closer the upstream HDD market, the investigation also shows that there would be still enough players active on the XHDD market in the near future. Those players would be able to sufficiently replace the competitive constraint between Seagate and Samsung and removed by the proposed transaction.
- (514) Fourth, the analysis of the closeness of competition between the Parties did not indicate that the intensity of competition between the parties would be significantly underestimated by the current market share level.

⁴²⁵ Horizontal Merger Guidelines paragraph 18.

(515) Finally, the notified transaction is unlikely to enable the merged entity to hinder expansion by most of its competitors as it will not have the ability and nor incentive to make the expansion of a relevant number of its XHDD competitors significantly costlier., i.e. the notified transaction is not likely to lead to an input foreclosure which may lead to higher prices for XHDD customers.

The current market structure shares of the merged entity does not indicate significant non-coordinated effects

(516) In the EEA, non- integrated producers appear to represent about 44% of the overall XHDD market and market shares are as follows, according to data submitted by the Notifying Party:⁴²⁶

European market shares for external drives in 2010

Table 32, EEA XHDD market shares 2008-2010 (in value)

Companies	2008	2009	2010
Seagate	[10-20]*%	[10-20]*%	[10-20]*%
Samsung	[0-5]*%	[0-5]*%	[0-5]*%
Seagate/Samsung Combined	[10-20]*%	[10-20]*%	[10-20]*%
WD	[20-30]*%	[20-30]*%	[20-30]*%
HGST	[0-5]*%	[0-5]*%	[0-5]*%
Toshiba/Fujitsu	[0-5]*%	[5-10]*%	[0-5]*%
All integrated XHDD suppliers	[40-50]*%	[50-60]*%	[50-60]*%

⁴²⁶ The Notifying Party notes that the GfK data is ascertained through a sample of retail locations and does not provide estimates of the full volume of retail transactions, nor does it include non-retail purchases of external storage devices (for example, or internet purchases). Therefore, this data only gives some indication as to the market shares of XHDD suppliers.

Iomega	[10-20]*%	[10-20]*%	[10-20]*%
LaCie	[10-20]*%	[5-10]*%	[5-10]*%
Verbatim/Freecom	[5-10]*%	[5-10]*%	[5-10]*%
Buffalo	[0-5]*%	[0-5]*%	[0-5]*%
Others (non-integrated supplier)	[20-30]*%	[10-20]*%	[10-20]*%

Source: The Notifying Parties best estimates for the EEA based on its internal market knowledge and on GFK retail data for France, Germany and the UK. The market share estimates are rounded respectively.

- (517) WD is the leading XHDD supplier in the EEA with a market share of approximately [20-30]*% in 2010. It has kept its leading position over the last 3 years. Also post transaction, WD will remain the number one player in the EEA market.
- (518) Seagate and Iomega are in second position with less than half the market share of WD, [10-20]*% respectively in 2010. Seagate lost [5-10]*% points between 2008 and 2010.
- (519) Recent entrants are Samsung, HGST and Toshiba. Samsung entered the market in 2008 and was able to gain a [5-10]*% market share in 2010. HGST also entered the market in 2008 and gained a [0-5]*% market share in 2010. Toshiba's market shares fluctuated over the past three years from [0-5]*% in 2008, [5-10]*% in 2009 to [0-5]*% in 2010. It has been active in the market since 2006.
- (520) There are also a number of non-integrated market players active in the EEA. The largest one is Iomega which was able to grow its market share to [10-20]*% in the last years. Other significant players are Verbatim/Freecom and LaCie. LaCie used to be one of the leading players in the EEA but has been losing market shares in the recent years. It has a market share of only [5-10]*% in 2010. Verbatim was only able to stabilize its market share position by its acquisition of Freecom in 2009. Besides these still sizeable players, there are a number of smaller players like Buffalo and CNMemory. However, the number of non-integrated players in the XHDD market is constantly shrinking.
- (521) After the proposed transaction, the merged entity will be the number 2 player with a combined market share of [10-20]*% with an increment of [5-10]*%. It will be still one third smaller than the number one player, WD. The combined market share

of the merged entity along with the modest increment indicates, prima facie, that the notified transaction would be unlikely to lead to a significant impediment to effective competition.⁴²⁷

The dynamic development of the market

- (522) The market investigation indicates that there is currently a strong trend in the EEA-XHDD market. The HDD manufacturers who have for the most part only recently entered the XHDD market have been rapidly gaining market shares to the detriment of the non-integrated XHDD suppliers.
- (523) According to the internal document of the Notifying Party, there are indications that the HDD manufacturers expect that there would be a further worldwide industry consolidation and "*shake-out*" of non-integrated XHDD suppliers. According to the [internal documents]* of Seagate from 2010, non-integrated XHDD manufacturers have been losing market shares each year to the benefit of vertically-integrated manufacturers: [...]*.⁴²⁸
- (524) The market investigation indicates that HDD suppliers are more and more reluctant to supply their XHDD competitors with competitive inputs. In particular, WD seems to have significantly decreased its supplies to XHDD suppliers in recent years. Non-integrated suppliers claim that the integrated players also favour their own XHDD production in terms of price and availability.
- (525) Table 32 illustrates this dynamic trend. Smaller market players were either acquired or exited the market. Based on a number of assumptions (based on various third-party data), Seagate estimates that approximately 60 firms have ceased supplying XHDDs in the last few years.⁴²⁹ An internal strategic business paper of Seagate even assumes that the integrated XHDD suppliers have already roughly a [70-80]*% market share worldwide.⁴³⁰ The market should therefore be assessed in this case from a dynamic perspective taking into account the rapid trend of the last years for the years to come.
- (526) Taking in account only the current market shares of the vertically-integrated XHDD players and proportionally subtracting the non-integrated XHDD manufacturers, the leading market player, WD, would have a [50-60]*% market share, followed by Seagate/Samsung ([30-40]*%), HGST ([5-10]*%) and Toshiba ([5-10]*%).
- (527) However, even taking this theoretical worst-case scenario, three credible alternative suppliers would be present in the EEA market for XHDDs after the proposed transaction. One of them, WD would be considerably larger than the merged entity, while HGST and Toshiba would be credible existing competitors

⁴²⁷ Cf. Horizontal Merger Guidelines, paragraph 18.

⁴²⁸ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

⁴²⁹ Seagate reply to the Commission's request for information of 26 August 2011, question 17.

⁴³⁰ Confidential Seagate Annex 31 to the Form CO, [Seagate's internal documents]*.

that would at least have the potential to impose a competitive constraint on the merged entity.

Seagate and Samsung are not particularly close competitors

- (528) Both Parties are able to use their captive HDDs for their XHDDs. It has to be borne in mind that HDDs are by far the most important input of an XHDD. The HDD determines to a large extent the price and the capacity as well as the mobility. The market respondents indicate that these are also the most important characteristics for the XHDD end-customers.⁴³¹ However Seagate and Samsung are not particularly close competitors in the upstream HDD markets.
- (529) Indeed, even looking only at the integrated XHDD suppliers, the broad majority of market respondents did not consider Seagate and Samsung to be particularly close competitors.⁴³²
- (530) Moreover, the identity of the Parties' top ten 10 EEA customers is considerably different as well as the mix of customer types. While Seagate's top 10 XHDD EEA-customers are [...]*, Samsung's top 10 EEA customers include [...]*. From the top five customers of each Party, only one customer is identical.⁴³³
- (531) It may therefore be concluded that Seagate and Samsung are not particularly close competitors in the EEA market for XHDDs.

The merged entity will not have the ability nor the incentive to foreclose a significant part of the market

- (532) The market investigation further shows that the merged entity will not have the ability or the incentive to foreclose a sufficient part of the XHDD market in the EEA.
- (533) First, WD and HGST are also vertically integrated and therefore, do not depend on the merged entity for their HDD input. Toshiba can also self-supply itself with the necessary input for its 2.5" XHDD products. These already constitute the majority of XHDD sales and their importance is expected to continue to increase.
- (534) Therefore, any effect could only be in respect of the non-integrated players which accounted in 2010 for 44% of the XHDD market in the EEA. Indeed, a number of non-integrated XHDD suppliers have voiced concerns about the proposed transaction.
- (535) For input foreclosure to be a concern, the vertically integrated firm resulting from the merger must have a significant degree of market power in the upstream market. It is only in these circumstances that the merged firm can be expected to have a significant influence on the conditions of competition in the upstream

⁴³¹ Customers reply to the Commission's request for information of 19 July 2011, question 15.

⁴³² Competitors reply to the Commission's request for information of 22 June 2011, question 14.

⁴³³ Seagate and Samsung reply to the Commission's request for information of 23 June 2011, question 11.

market and thus, possibly, on prices and supply conditions in the downstream market.⁴³⁴

- (536) In neither of the relevant upstream HDD markets, the market shares of the merged entity indicate that the merged entity would have a significant degree of market power post-merger. Additionally, as explained in Sections 5.3.3 to 5.3.6, the Commission's investigation in the upstream markets showed that post-merger, the merged entity will not be able to obtain or exercise significant market power in the various HDD markets.
- (537) Moreover, the market investigation did not indicate a likelihood of an incentive to foreclose non-integrated XHDD producers. There are no indications that Seagate and Samsung have in the past restricted input to XHDD suppliers or increased prices, possibly aimed at driving non-integrated XHDD suppliers out of the market. After the proposed transaction, the merged entity's market shares only increase moderately with an increment of [5-10]*%. There are no indications that this moderate increase would be decisive to change Seagate's or Samsung's ability and incentives in this regard.
- (538) Also the margins of the Parties downstream are not significantly higher than upstream which makes a foreclosure strategy less likely. Also the current level of the combined market shares of under [20-30]*% does not increase the likelihood that the merged entity would have an incentive to restrict its sales of HDDs as input to non-integrated XHDD suppliers. There are also no indications that the merged entity would recoup a higher proportion of shares lost by non-integrated XHDD suppliers' than its current share of downstream sales would indicate.
- (539) Therefore, it may be concluded that the merged entity would neither have the ability nor the incentive to foreclose a significant part of the XHDD market. The Commission therefore concludes that the proposed transaction is not likely to lead to a significant impediment to effective competition on the EEA market for XHDDs.

5.3.8. Conclusion on non-coordinated effects

- (540) In light of the above, the proposed transaction is not likely to give rise to non-coordinated effects that would significantly impede effective competition on any of the worldwide HDD markets (3.5" Desktop HDDs, 2.5" Mobile HDDs, 3.5" Business Critical HDDs, 3.5" CE HDDs) or the EEA market for XHDDs.

5.4. ASSESSMENT OF COORDINATED EFFECTS

- (541) The Commission's investigation also assessed whether the transaction would lead to a significant impediment to effective competition stemming from coordinated effects.

⁴³⁴ Non-horizontal Merger Guideline, paragraph 35.

5.4.1. The View of the Notifying Party

- (542) The Notifying party submits that there is no specific effect of the merger with respect to potential coordinated effects, such that Samsung's removal alone would transform a competitive market into one of durable coordination imposed upon customers.
- (543) Second, given the asymmetry of market shares, there would be a clear lack of incentive for HGST to participate in any coordination. Moreover, Seagate or Western Digital would be unable to punish HGST if it deviated from a "status quo".
- (544) Third, constant innovation in HDDs would render attempted coordination inherently unstable, and the short time between innovation cycles, in conjunction with the benefits of being first to market, undermine any incentive to coordinate.
- (545) Fourth, stability of coordination is in any event implausible given the OEMs' ability and incentive to deter and disrupt coordination instead of accepting higher prices, by switching suppliers and/ or facilitating entry by Toshiba into the 3.5" desktop space.
- (546) Finally, the quarterly investor calls by Western Digital and Seagate communicating estimations of next quarter's Total Available Market (TAM) do not allow the companies to develop a "shared understanding" that would assist output allocation after the proposed transaction. The statements do not contain TAM projections by product type. This granularity would however be required to coordinate on output given differences in margins between HDD types, ease of supply side switching and ability to add capacity rapidly. Moreover, actual realisations of supply and demand often differ significantly from the forecasts.

5.4.2. The Commission's assessment

- (547) To assess coordinated effects, the Horizontal Merger Guidelines⁴³⁵ and well-established case law⁴³⁶ require proof that the merger will make coordination more likely, more effective and more sustainable. The analysis needs to focus in particular on (1) the ability to reach terms of coordination; (2) the ability to monitor deviations; (3) the existence of a credible deterrent mechanism if deviation is detected; and (4) the reactions of outsiders such as potential competitors and customers.
- (548) With respect to the ability to reach the terms of coordination, one can note, firstly, that it is easier to coordinate among a few players than among many.⁴³⁷ The proposed transaction leads to a reduction of HDD suppliers to four manufacturers in the markets for 2.5" Mobile.⁴³⁸ The Commission's market investigation did not

⁴³⁵ Horizontal Merger Guidelines, paragraphs 39 pp.

⁴³⁶ See for example Case T-342/99, *Airtours plc v. Commission* [2002] ECR II-2585; Case T-464/04, *Impala v. Commission*, [2006] ECR II-2289; Case C-413/06 P, *Bertelsmann and Sony Corporation of America v. Impala*, [2008].

⁴³⁷ Horizontal Guidelines, paragraph 45.

⁴³⁸ Toshiba is a potential 4th competitor in the markets of 3.5" Business Critical Enterprise given that it recently entered the Business Critical 3.5" market. However, Toshiba has not yet gained any market share

reveal evidence of successful coordination in relevant markets such as 3.5" Desktop, in which only four HDD suppliers are currently competing with each other.⁴³⁹ This indicates that a reduction to four HDD manufacturers post-merger does not necessarily imply a merger-specific risk of coordination in those markets.

(549) Second, the removal of Samsung does not cause a material merger-specific effect in a number of relevant markets due to Samsung's identity. This applies notably to the markets for 3.5" Business Critical Enterprise HDDs and for 3.5" CE HDDs. In all of those markets, Samsung has no, or an insignificant⁴⁴⁰, presence before the proposed transaction.

(550) As regards the market for 3.5" desktop HDDs, it can be noted, thirdly, that Samsung is not a particularly strong innovative force or a particularly strong competitor. Therefore, Samsung is unlikely to uniquely have constrained suppliers' ability to coordinate or sustain coordination pre-merger in these markets. The effect of Samsung's removal is therefore likely to be limited with regard to coordinated effects.

(551) Fourth, firms may find it easier to reach a common understanding on the terms of coordination if they are relatively symmetric, including in terms of market shares.⁴⁴¹ In the 3.5" Desktop HDD market, the combined entity has [50-60]*% of sales, WD [30-40]*%, and HGST accounting for [10-20]*% of sales. With a difference between HGST and the combined entity of more than 4 to 1, and between WD and HGST of more than 3:1, the level of post-merger asymmetry would remain high.

(552) Furthermore, HGST has the incentive to expand sales and grow its share from [10-20]*% in 3.5" Desktop HDD after the proposed transaction. It is unlikely to accept the status quo of remaining in a distant third place compared to Seagate and Western Digital. For one, the market investigation indicates that certain OEMs currently sourcing from Samsung would likely shift (desktop) business to HGST following the proposed transaction,⁴⁴² allowing HGST to further grow in this market. Moreover, as shown in section 5.3.3, HGST has long had the strategy to gradually grow its share in Desktop to increase its scale in order to reduce its operating expenses relative to revenue.[...]*:

[This view is supported by the Parties' internal documents]*⁴⁴³

and its success in this market is uncertain. Therefore, the aforementioned markets are not included into those with four remaining competitors.

⁴³⁹ See for instance customers reply to the Commission's request for information of 19 April 2011 questions 62, 26 and 76. Furthermore, out of 40 customers replying to the Phase I questionnaire to customers, only one XHDD provider considered that the merger's impact would be an increase in the "likelihood of a cartel".

⁴⁴⁰ Equal or less than [0-5]*% market share.

⁴⁴¹ Horizontal Guidelines, paragraph 48.

⁴⁴² Customers reply to the Commission's request for information of 19 April 2011, questions 63 and 63.1.

⁴⁴³ [...]*, Storage Device Industry – Competitive Analysis, Undated (approximately 1st Half of 2010).

(553) Therefore, it is likely that HGST would have strong incentives not to participate in any coordination in the 3.5" Desktop market that seeks to preserve the status quo, and/or to deviate from attempted coordination.

(554) In light of the above, it is apparent that it is unlikely that the proposed transaction will increase the ability of the remaining HDD suppliers to reach terms of coordination. Furthermore, it is likely that HGST would have incentives to deviate from any possible coordination. With respect to the EEA-wide market for XHDDs it is apparent that coordinated effects are even more unlikely due to the fragmented structure of that market (characterised by a higher number of suppliers holding smaller market shares). Therefore, the proposed transaction is not likely to give rise to coordinated effects.

5.4.3. Conclusion on coordinated effects

(555) In light of the above, it may be concluded that it is not likely that the proposed transaction gives rise to a significant impediment to effective competition stemming from coordinated effects in the relevant markets.

5.5. ASSESSMENT OF VERTICAL EFFECTS: CUSTOMER FORECLOSURE

(556) The proposed transaction gives rise to vertical relationships between the upstream markets for (i) heads and (ii) media which are two of the components used in the manufacture of HDDs and (iii) the downstream markets for HDDs which use those components.

(557) Before the proposed transaction Seagate is vertically integrated into the upstream supply of components for HDDs, notably heads and media. Samsung on the other hand is not vertically integrated and sources all of its heads and media requirements from third parties on the merchant market. After the proposed transaction, the combined entity might prefer in-house supply of heads and media to purchases on the merchant market.

(558) The Commission therefore carried out an assessment on the risk of customer foreclosure stemming from the proposed transaction to the detriment of respectively heads and media suppliers. Thus, given that Toshiba fully sources its upstream heads and media requirements from the merchant market, any foreclosure against heads and media suppliers could possibly also impair Toshiba's ability to source competitive components and therefore Toshiba's ability to compete on the downstream HDDs markets.

(559) According to paragraph 29 of the Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings⁴⁴⁴ ("the Non-Horizontal Merger Guidelines"): *"A merger is said to result in foreclosure where actual or potential rivals' access to supplies or markets is hampered or eliminated as a result of the merger, thereby reducing these companies' ability and/or incentive to compete. [...] Such foreclosure is regarded as*

⁴⁴⁴ OJ C265, 18 October 2008, p. 6.

anti-competitive where the merging companies – and, possibly, some of its competitors as well – are as a result able to profitably increase the price charged to consumers”.

- (560) In assessing the likelihood of anti-competitive customer foreclosure, the Commission examined whether: (i) the combined entity would have the ability post-merger to foreclose access of heads' and/or media's suppliers to a sufficient customer base by removing Samsung as an independent market player and significant customer; (ii) the combined entity would have the incentive to do so; (iii) a foreclosure strategy would have a negative impact on the viability of heads and/or media's suppliers' business; (iv) a foreclosure strategy would have a significant detrimental effect in the downstream markets for HDDs by impairing Toshiba's ability to effectively compete on those markets and therefore by allowing the merged entity to raise HDDs' prices.
- (561) The potential effects outlined in Recital 561 could be particularly acute on the market for Enterprise Mission Critical HDDs where a weakening of Toshiba's competitive strength could ultimately reduce the market players to only two, Seagate and HGST. This could result in anti-competitive effects on the downstream market for Enterprise Mission Critical HDDs.
- (562) The data provided by the parties in combination with the results of the market investigation showed that while the merged entity may have a certain ability to foreclose components suppliers, it will not have the incentive to do so and in any case, any attempt of foreclosure would have no significant effect on components' suppliers and by consequence on the downstream HDDs markets.

5.5.1. Heads

5.5.1.1. Introduction

- (563) Heads are key components for the production of HDDs and account for approximately 20 to 25% of the total value of an HDD. They are not employed in any other end-use application beyond HDDs.
- (564) Seagate, WD and HGST all produce heads internally and also purchase heads from TDK. None of the three vertically integrated players sell heads in the merchant market. Samsung and Toshiba purchase all their head requirements from TDK the only independent supplier of heads in the merchant market. As acknowledged by the Notifying Party itself, TDK invests heavily in R&D and has introduced a number of innovative head technologies in the recent years; therefore it can be appropriately described as a market leader in cutting edge technology.⁴⁴⁵
- (565) In the course of the market investigation concerns were voiced that Seagate's acquisition of Samsung could result in TDK being foreclosed from access to a sufficient customer base. This could result in significant revenues' losses for TDK which would translate in fewer resources for research and development for TDK.

⁴⁴⁵ Seagate reply to the Commission's request for information of 1 July 2011, question 8.

- (566) In turn, this would raise Toshiba's costs or severely impact Toshiba's ability to compete on the HDD markets (should TDK's viability be affected as a result of the loss of sales to Samsung) and by consequence, allow the merged entity to profitably establish higher HDD prices.
- (567) Such potential effects could be particularly acute on the market for Enterprise Mission Critical HDDs where the elimination of Toshiba as competitor would reduce the market players to only two (namely, Seagate and HGST after the proposed transaction and successful foreclosure). This could limit customers' ability to effectively multi-source Enterprise Mission Critical HDDs and result in anti-competitive effects on this market.
- (568) Against this background, the investigation has shown that (i) the merged entity would not be able to foreclose TDK from Samsung's purchases in the short term as it does not currently have spare capacity to meet the overall heads demand of Samsung; (ii) the merged entity would have limited incentives to source all its heads requirements internally; (iii) pursuant to a Letter of Intent ("LOI") entered into by Seagate and TDK on 3 August 2011, the merged entity will continue buying a sufficient volume of heads from TDK at least until 2014 which will allow TDK to continue operating on the market. As a consequence, Toshiba's ability to source sufficient and competitive heads will not be negatively impacted by the proposed transaction. Therefore, potential customer foreclosure after the proposed transaction is unlikely to undermine Toshiba's competitiveness in the HDD markets.

5.5.1.2. Ability to foreclose

- (569) The notifying Party claims that it currently does not have spare capacity to immediately internalize the whole of Samsung's demand for heads and that on the basis of its estimates, it would require [0-5]* years and high capital investment of a magnitude of USD 90-100 million in order to internalise all the merged entity's external demand for heads post-merger.⁴⁴⁶
- (570) [This view is supported by the Parties' internal documents]*.^{447 448}
- (571) In any event, Seagate confirmed that it would theoretically be able to produce internally all Samsung's requirements for heads in [0-5]* years. It can therefore be concluded that post-merger the merged entity would have in principle a certain

⁴⁴⁶ Seagate reply to the Commission's request for information of 13 July 2011, question 3 and 4. According to Seagate's estimates, the latter would need to increase its production capacity as to manufacture additional 60 million of HGA per quarter in order to internalise the whole Seagate and Samsung's combined external demand for heads (projected to amount to 70 million of heads per quarter). Considering that Seagate estimates that the average total capital cost to increase production capacity up to 1 million of additional heads could range from USD [0-5]* million for HGA, it follows from this that an investment of approximately USD [100-200]* million would be required to Seagate in order to produce additional 60 million of HGA per quarter.

⁴⁴⁷ Annex F provided by Seagate in reply to the Commission's request for information of 22 June 2011, question 59.

⁴⁴⁸ Seagate reply to the Commission's request for information of 1 July 2011, question 12.

ability to deprive TDK's of Samsung's purchases of heads over time, thereby foreclosing the latter from a significant customer.

5.5.1.3. Incentive to foreclose

(572) Despite Seagate's ability to internally cover all of Samsung's needs for heads in the medium term, the Notifying Party underlined that that it does not intend to do so for the following reasons.

(573) First, the Notifying Party points out that the present transaction does not entail any acquisition of heads production assets by Samsung which might change Seagate's incentives to pursue its current dual sourcing policy for heads. Seagate claims that it will, in fact, have an even greater need and economic incentive post-merger to source components (including heads) from third parties like TDK in order to continue supplying Samsung HDDs products.⁴⁴⁹

(574) Second, Seagate underlines that, although there are undeniable efficiencies to having component supply capabilities, it further recognizes that vertical integration exposes it to higher unit costs compared to non-vertically integrated HDD suppliers when demand for HDDs lowers. This is because when demand for HDDs lowers components capacity, utilization is not optimized. [Details of Seagate's sourcing strategy for heads]*.⁴⁵⁰

(575) Third, Seagate maintains that a dual sourcing strategy allows for the possibility of supplying more HDDs and in certain instances with higher quality than Seagate could do using only internal heads. This is the case as externally sourced heads have at times worked better with Seagate's HDDs than internal heads. When that occurred, Seagate qualified its drives with the externally purchased heads without which it would have not qualified some HDDs lines therefore losing the revenue opportunity associated to those products. Moreover, as explained by the Notifying Party, in those circumstances when Seagate qualifies HDDs with external heads it will rarely displace those heads through the product lifecycle with an internal head since customers are generally not willing to qualify two times the same HDDs containing different components than those originally qualified.⁴⁵¹

(576) Fourth, Seagate considers it necessary to continue sourcing part of the merged entity's needs for heads externally as to avoid having to halt HDD production in case of problems to its internal component production facilities.⁴⁵² This is also one of the reasons why Seagate has pursued a dual sourcing strategy for its heads relying for [a considerable part]* of its overall needs on external suppliers in the last three years.

(577) Finally, Seagate points out that its intention to continue its supply relationship with TDK is also confirmed by the fact that it recently entered into a binding LOI with

⁴⁴⁹ Seagate comments of 13 June 2011 on the Article 6(1)(c) Decision of 30 May 2011, p. 31.

⁴⁵⁰ According to the information provided by Seagate, it results that in the following quarters: [Details on Seagate's sourcing strategy for heads]*.

⁴⁵¹ Seagate reply to the Commission's request for information of 13 July 2011, question 7.

⁴⁵² Seagate comments of 13 June 2011 on the Article 6(1)(c) Decision of 30 May 2011, p. 31.

TDK which sets the purchase commitments for heads for an initial term of 3 years (the initial term of the agreement is from 31 December 2011 to 30 November 2014).⁴⁵³

(578) It is considered that the Notifying Party's arguments are valid and that the merged entity will have strong incentives to continue sourcing part of its heads requirements from TDK in the coming years consistent with Seagate's current dual sourcing strategy.

(579) This conclusion appears reasonable particularly in light of the HDD sales that the merged entity could risk to lose without an external source of heads, should its production facilities be unable to meet the merged entity's demand for heads or the quality level requested by customers for their HDDs. As a consequence, the risk of losing important sales of HDDs is a significant deterrent for the merged entity to pursue a foreclosure strategy to the detriment of TDK's sales, particularly in view of the benefits that a dual sourcing strategy would bring to the merged entity post-merger. The advantages of a dual sourcing strategy were also confirmed by the results of the Commission's market investigation showing that also the other vertically integrated players, namely, WD and HGST purchase externally part of their heads requirements.

(580) To conclude, Seagate's incentive to continue sourcing TDK's heads post-merger will be strengthened further by virtue of the LOI recently entered into by Seagate and TDK.

5.5.1.4. Impact on effective competition

(581) The market investigation revealed that irrespective of the ability and the low incentives of the Notifying Party to pursue a foreclosure strategy against TDK, the proposed transaction would not have any effect on TDK's business in view of the LOI entered into between Seagate and TDK on 3 August 2011 which establishes Seagate's purchase commitments for heads for the following three years.

(582) [...]*.⁴⁵⁴

(583) As a result of that agreement, TDK will be granted a sufficient volume of sales which will allow the latter to remain and operate in the market with the current level of sales and investment in R&D.⁴⁵⁵ Moreover, the market investigation revealed that any potential reduction of the volume of heads sold by TDK to the merged entity as compared to the current level could be compensated by future heads demand which is expected to significantly increase in the coming years in line with the forecasted growth of those HDD markets.⁴⁵⁶

⁴⁵³ LOI submitted by Seagate on 3 August 2011.

⁴⁵⁴ [...]*

⁴⁵⁵ TDK reply to the Commission's request for information of 13 July 2011, question 5.

⁴⁵⁶ HDDs suppliers reply to the Commission's request for information of 13 July 2011, question 1.

(584) In light of the above, it may be concluded that the proposed transaction is unlikely to have any significant adverse effects on TDK's business. Consequently it is also unlikely to weaken Toshiba's ability to competitively source its heads requirements and to effectively compete on the HDDs markets.

5.5.1.5. Conclusion

(585) In light of the arguments outlined in Recitals (563) to (584) [...]*, it may be concluded that the proposed transaction is not likely to significantly impede effective competition in any of the HDD markets due to their vertical relationship with the upstream market for heads.

5.5.2. Media

5.5.2.1. Introduction

(586) Media constitute important components in the manufacture of HDDs which are also internally produced by Seagate, WD and HGST. Samsung currently purchases its entire media requirements from [external supply sources]*⁴⁵⁷ while Seagate only externally buys [a less significant amount]*.⁴⁵⁸ Toshiba sources all of its demand for media externally.⁴⁵⁹

(587) By analogy with the heads, the investigation aimed to assess whether the transaction might led to the foreclosure of Showa Denko from a sufficient customer base (by removing Samsung as a purchaser of media) in such a way as to impair the viability of Showa Denko's business with the consequence to prevent Toshiba from obtaining sufficient and competitive media to produce HDDs. This would in turn impair Toshiba's ability to compete in the HDD markets against the merged entity which could take advantage of the reduced competitive pressure to increase its HDD prices.

(588) However, the proposed transaction is unlikely to negatively impact the viability of Showa Denko and by consequence Toshiba's ability to competitively source media.

5.5.2.2. Ability to foreclose

(589) The Notifying party submits that it currently does not have enough spare capacity⁴⁶⁰ to internalize all of Samsung's needs for media and that, as in the case of heads, it would need [one to five]* years and a significant capital investment to do so.⁴⁶¹

⁴⁵⁷ Samsung reply to the Commission's request for information of 6 July 2011, question 2.

⁴⁵⁸ According to the information provided by Seagate it results that in 2010 it produced 344 million units and purchased 19 million units from Fuji. Reply of Seagate to the Commission RFI of 13 July 2011, question 10.

⁴⁵⁹ Toshiba reply to the Commission's request for information of 14 June 2011, question 60.

⁴⁶⁰ Annex G provided by Seagate in reply to the Commission's request for information of 22 June 2011, question 60.

⁴⁶¹ Seagate reply to the Commission's request for information of 22 June 2011, question 63.

(590) Given this production capacity restriction at least in the short term to internalise all of Samsung's demand for media, Seagate could in the alternative decide to shift Samsung's media purchases from Showa Denko to Fuji [...]*. Such combined purchasing strategy could be commercially advantageous.

(591) However, the market investigation showed that this strategy would not be immediate.

(592) It follows that the merged entity would be able to deprive Showa Denko's of Samsung's purchases of media (either internalising Samsung's media requirements or shifting its purchases to Fuji) only in the medium term.

5.5.2.3. Incentives to foreclose

(593) The Notifying Party claims that post-merger it does not intend to source all of the merged entity's demand for media internally and that it plans to procure [a certain amount of]* the merged entity's demand for media from external sources.⁴⁶² In this regard, Seagate points out that the same arguments provided in relation to the benefits of a dual sourcing strategy of heads⁴⁶³, notably, the advantages to keep unit production costs down while having the possibility to meet increased demand of HDDs by sourcing externally its components, apply *mutatis mutandis* to media.

(594) The Notifying Party's statements appear valid particularly in light of the advantages associated to a dual sourcing strategy as compared to the risk of losing business opportunities that the absence of external components suppliers might cause.

(595) It follows that the merged entity will have strong incentives to continue sourcing part of its media requirements from external suppliers (either Fuji or Showa Denko) in the coming years.

5.5.2.4. Impact on effective competition

(596) The market investigation revealed even in the unlikely scenario where Showa Denko were to lose all of Samsung's purchases of media post-merger, the viability of its business would not be impaired as projected demand for media for 2011 would compensate this loss.⁴⁶⁴ As a result, Showa Denko's turnover post-merger is expected to be preserved in a way that it will be able to competitively operate on the market. This conclusion is also corroborated by Toshiba's announcement (16 July 2011) of an advanced technology centre with TDK and Showa Denko. This initiative will result in the development of new technologies which in turn may increase TDK's and Showa Denko's attractiveness as suppliers also for the vertically integrated manufacturers.

⁴⁶² Seagate reply to the Commission's request for information of 13 July 2011, question 12.

⁴⁶³ Seagate reply to the Commission's request for information of 22 June 2011, question 52.3.

⁴⁶⁴ HDD suppliers reply to the Commission's request for information of 13 July 2011, question 2.

(597) It may be concluded from the foregoing that the proposed transaction is not likely to have any significant adverse effect on Showa Denko's business and by consequence on Toshiba's ability to source its media requirements and to effectively compete on the HDD markets. This consideration appears even more pertinent in light of the fact that Toshiba would be able to continue sourcing competitive media from two suppliers instead of only one as in the case of heads (given that TDK is the only supplier of heads in the merchant market).

5.5.2.5. Conclusion

(598) In light of the arguments explained in the Recitals (586) to (597), it may be concluded that the proposed transaction will not significantly impede effective competition in any of the HDDs markets due to their vertical relationship with the upstream market for media.

VI. CONCLUSION

(599) It is accordingly concluded that the proposed transaction is not likely to significantly impede effective competition in the internal market or in a substantial part of it.

HAS ADOPTED THIS DECISION:

Article 1

The notified operation whereby Seagate Technology Public Limited Company acquires sole control of the HDD Business of Samsung within the meaning of Article 3(1)(b) of Regulation (EC) No 139/2004 is hereby declared compatible with the internal market and the functioning of the EEA Agreement.

Article 2

This Decision is addressed to: Seagate Technology Public Limited Company, Arthur Cox Building, Earlsfort Terrace, Ireland - Dublin 2.

Done at Brussels, 19.10.2011

For the Commission
(signed)
Joaquin ALMUNIA
Vice-President