

Exhibit F

White Paper of Timothy J. Bresnahan

I. Introduction and Overview of Conclusions.

I have been asked by Barnes & Noble, Inc. (“Barnes & Noble”) to provide an opinion as to Microsoft’s current conduct with respect to mobile operating systems. I have based my analysis on publicly available evidence and representations made to me by Barnes & Noble. Further, I have relied on my prior knowledge about competition in operating systems, mobile devices and personal computers from over twenty years of studying the industry and, particularly, my study of and familiarity with Microsoft’s pattern of anticompetitive conduct. Based on my extensive policy and academic experience in applying economics to antitrust analysis under both U.S. and EU law, including my prior work analyzing Microsoft’s conduct in connection with its PC operating systems monopoly, this white paper offers the following conclusions:

- Mobile operating systems, including those used for smartphones, e-readers and tablets, pose a competitive threat to Microsoft’s monopoly in PC operating systems.
- Microsoft’s current conduct in asserting against Barnes & Noble patents that I am informed are trivial and outmoded is anticompetitive and appears to be part of a larger Microsoft campaign against the open-source Android mobile operating system.
- Microsoft’s current conduct with respect to mobile operating systems, particularly its anticompetitive conduct against Android, parallels its prior anticompetitive response to threats from competing operating systems (e.g., DR-DOS) and Internet technologies (e.g., Java and Netscape).

II. Qualifications.

My opinion is based on my extensive policy and academic experience in applying economics to antitrust analysis under the U.S. and EU laws. In particular, from 1999 to 2000, I was Deputy Assistant Attorney General and Chief Economist, Antitrust Division, U.S. Department of Justice. I am currently the Landau Professor in Technology and the Economy and Professor of Economics at Stanford University, and a Senior Fellow at the Stanford Institute for Economic Policy Research (SIEPR). At SIEPR, I have served as the Director of the Center for

Employment and Economic Growth, the Director of the Technology and Economic Growth Program, and the Gordon and Betty Moore Senior Fellow. I was one of the founders of, and later the leader of, the Stanford Computer Industry Project. I am also a Senior Fellow at the National Bureau of Economic Research and participate in the Productivity and Industrial Organization Programs that study technical progress and competition. I have been elected as a Fellow of the American Academy of Arts and Sciences, as a Fellow of the Econometric Society, and as a Vice President of the American Economics Association. My areas of specialization include Industrial Economics, particularly the economics of high technology industries. I have had particular specializations in the uses of computer systems in large organizations, in the commercialization of computer systems, and in the analysis of competition and of competition policy. I have written books, book chapters, and peer-reviewed articles on the economics of technological change and competition in high technology industries. A number of these publications examine Microsoft's competitive conduct.¹

III. Microsoft Has Failed to Compete Effectively in Mobile Operating Systems.

Microsoft has failed to compete effectively in mobile operating systems. As I explain below, it has failed to deliver a competitive product to consumers and has not been a leader in the innovation process for mobile operating systems. As a result, it has missed a profitable business opportunity and now faces a potentially serious threat to its monopoly in PC operating systems.

A. Overview of Mobile Operating Systems.

Mobile operating systems are used on a variety of devices, including smartphones, e-readers and tablets. Smartphones are high-end mobile phones with computing capability. Operating systems for these devices are supplied primarily by Microsoft, Apple, Google, Palm and Nokia. An e-reader is a portable electronic device designed primarily for reading digital books and periodicals, and is similar in form to a tablet computer. Examples include the Amazon Kindle and the Barnes & Noble Nook products. E-readers use operating system software supplied by Google, Microsoft, and providers of the open-source Linux operating

¹ A selected list of my publications related to Microsoft and competition is attached hereto as Appendix A.

system. Tablets are mobile devices that offer display screens of 7 to 12 inches and run a mobile or desktop operating system. Examples include the Apple iPad, Motorola Xoom, Blackberry Playbook, Dell Streak, and Samsung Galaxy.² Tablets use operating systems supplied by Apple, Google, Research in Motion, Nokia, and others.

The direct customers for iOS, Android, Windows Phone 7 and other mobile devices are the mobile device manufacturers (“original equipment manufacturers” or “OEMs”) that decide which operating systems to use for the devices they sell. All of these mobile operating systems also compete for adoption by end-users who choose which mobile device to purchase based in part on the operating system.

The structure of the mobile operating system marketplace is somewhat unusual. The leading company, Apple, is vertically integrated into hardware. This does not mean it is not a meaningful competitor for end-users of mobile systems. It means only that it does not rely on independent OEMs to put its software together with hardware and distribute the resulting product to end-users. Another leading supplier of mobile operating systems, Google, gives away its Android product to OEMs. The very attractive price at which Android is available to OEMs is one reason it has been so widely adopted. Microsoft’s primary business model has been to sell its mobile operating systems to OEMs, the same business model it has used in selling its PC operating system.

Although these OS suppliers have pursued different business models, they have nonetheless been the leading competitors in mobile operating systems. Google and Apple have been successful competitors. Microsoft, in contrast, has not.

B. Microsoft Has Failed as an Innovator in Mobile Operating Systems.

To date, Microsoft has not been an important innovator in mobile operating systems. It has lagged behind Apple and Google in smartphones and has been strikingly uncompetitive in the tablet and e-reader segments.

² Given the recent emergence of tablet devices, industry analysts offer conflicting definitions, and some distinguish between *media tablets* such as the iPad and *tablet PCs* that run a full desktop operating system. See IDC press release, “IDC forecasts 7.6 Million Media Tablets to be Shipped Worldwide in 2010,” May 20, 2010, <http://www.idc.com/getdoc.jsp?containerId=prUS22345010>. See also CNET News, “What makes a tablet ? (FAQ),” May 28, 2010, http://news.cnet.com/8301-31021_3-20006077-260.html?tag=newsLeadStoriesArea.1.

1. Microsoft Has Failed to Compete Effectively in Smartphone Operating Systems.

Microsoft has a weak position in smartphone operating systems because it has not delivered a compelling product that can compete effectively with the operating systems offered by Apple and Google, among others. Both hardware (the handset) and the operating system affect the quality of the phone as experienced by the user. Apple has extended its business model used in PCs and iPods of combining striking hardware and a user-engaging operating system to create the very successful iPhone it introduced in 2007. Using this model, Apple had gained a 25% share of the U.S. smartphone installed base by December 2009,³ and had become the world's largest smartphone vendor by revenue in the first quarter of 2011⁴

Sales of smartphones based on the Android operating system, introduced a year later than the iPhone, were propelled by a different, but also successful business model. Google has organized the supply of its mobile operating system to function as a public good. It offers its operating system free of charge on an open-source basis to OEMs, imposes no restrictions on the use of the operating system, and requires that users who improve the product make those improvements available to others. This approach has been attractive to OEMs. In 2008-2009, Android-based smartphones were launched by HTC, Samsung, Motorola and LG, among others.⁵ Despite entering the market more than a year after the iPhone, sales of Android-based smartphones surpassed sales of Apple's iPhone in the second quarter of 2010 in the United States.⁶ In the spring of 2011, industry experts were predicting that Android devices would account for nearly 50% of worldwide smartphone unit sales by 2012.⁷

³ Much of the share gain came from sales to the rapidly expanding consumer base of smartphone users and some came by winning enterprise sales from RIM's Blackberry product line. Federal Communications Commission, "Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services," May 20, 2010 ("2010 Annual Report"), p.166

⁴ Strategy Analytics, "Apple Becomes World's Largest Handset Vendor by Revenue in Q1 2011," April 21, 2011.

⁵ 2010 Annual Report, pp. 224-233.

⁶ CNET News, "Android hits top spot in U.S. smartphone market," August 4, 2010.

⁷ Gartner Group, "Gartner Says Android to Command Nearly Half of Worldwide Smartphone Operating System Market by Year-End 2012," April 7, 2011.

Overall, smartphone sales have exploded since 2007. Unit sales of smartphone operating systems have grown by 34%.⁸ Sales of smartphones with the Apple or Google operating system account for most of this growth. Indeed, smartphones running iOS or Android grew from virtually nothing in 2007 to 35% of unit sales of smartphone operating systems in 2010.⁹

Despite the rapid growth in smartphone sales, sales of phones based on operating systems supplied by Microsoft have languished. Microsoft's primary business model in smartphone operating systems has been based on selling its OS to handset makers, and it has been successful in attracting OEMs. In 2008-2009, OEMs that offered Android-based phones generally offered handsets based on Windows as well. For example, HTC, LG, Samsung, Toshiba, and ZTE all offered phones running the Windows Mobile operating system.¹⁰ Nonetheless, the worldwide market share held by Windows-based smartphones declined from 12% in 2007 to 4.2% in 2010, and 2010 worldwide unit sales were *below* unit sales in 2007.¹¹ Consumers have clearly preferred to purchase phones based on the Android platform when given a choice between the Android and Microsoft operating systems from the same handset manufacturer.

Microsoft has failed to compete effectively because it has failed to offer a product that can compete with the offerings of Apple and Google. In February 2007, the year the iPhone was released, Microsoft released a new version of its smartphone operating system, Windows Mobile 6.¹² The product contained a number of serious deficiencies, including weak support for touchscreens, applications that required use of a stylus rather than a finger, and a poor mobile

⁸ Gartner Group, "Gartner Says Worldwide Smartphone Sales Reached Its Lowest Growth Rate With 3.7 Per Cent Increase in Fourth Quarter of 2008," March 11, 2009; Gartner Group, "Gartner Says Worldwide Mobile Device Sales to End Users Reached 1.6 Billion Units in 2010; Smartphone Sales Grew 72 Percent in 2010," February 9, 2011.

⁹ Gartner Group, "Gartner Says Worldwide Smartphone Sales Reached Its Lowest Growth Rate With 3.7 Per Cent Increase in Fourth Quarter of 2008," March 11, 2009; Gartner Group, "Gartner Says Worldwide Mobile Device Sales to End Users Reached 1.6 Billion Units in 2010; Smartphone Sales Grew 72 Percent in 2010," February 9, 2011.

¹⁰ Microsoft press release, "Microsoft Unveils New Windows Phones Worldwide," October 6, 2009, <http://www.microsoft.com/presspass/press/2009/oct09/10-06WindowsPhoneLaunch09PR.msp>.

¹¹ Gartner Group, "Gartner Says Worldwide Smartphone Sales Reached Its Lowest Growth Rate With 3.7 Per Cent Increase in Fourth Quarter of 2008," March 11, 2009; Gartner Group, "Gartner Says Worldwide Mobile Device Sales to End Users Reached 1.6 Billion Units in 2010; Smartphone Sales Grew 72 Percent in 2010," February 9, 2011.

¹² Microsoft press release, "Microsoft Reveals New Windows Mobile 6 Smartphone Software, Improves World's Fastest-Growing Mobile Operating System," February 12, 2007, <http://www.microsoft.com/presspass/press/2007/feb07/02-11WM6SoftwarePR.msp>.

browser.¹³ One industry analyst described Windows Mobile 6 as a “miserable” user experience.¹⁴ Microsoft began work in 2008 on a follow-on product, Windows Phone 7, that it planned to introduce in 2009, but due to development delays, the first handsets using Windows Phone 7 did not ship until November 2010. In the interim, handset manufacturers reduced or dropped support for Windows Mobile and turned to other operating systems, primarily to Android.¹⁵

Microsoft’s record of failures in mobile operating systems extends to its “social phone” handset product, the Kin, which Microsoft introduced in April 2010.¹⁶ Targeting heavy users of social networks, the Kin relied on technology acquired from Danger, producer of the popular Sidekick phone.¹⁷ Microsoft invested nearly two years in developing the Kin, but pulled it from the market a mere 48 days after the product launch after selling fewer than 10,000 units. Industry analysts described the product as “an absolute failure” and “a mistake from the get-go.”¹⁸

Microsoft CEO Steve Ballmer has acknowledged Microsoft’s costly missteps in mobile operating systems. He admitted in 2009 that Microsoft had “screwed up with Windows Mobile,” and wished that Windows Phone 7 had already been launched.¹⁹ He characterized an interim 2009 release of Windows Mobile 6 as “an unwanted stopgap.”²⁰ And he stated in a 2010 *Wall*

¹³ Ars Technica, “Windows Mobile 6.5 UI a big improvement; more work needed,” February 16, 2009, <http://arstechnica.com/microsoft/news/2009/02/ballmer-windows-mobile-65-phones-are-just-windows-phones.ars>. See also Ars Technica, “Microsoft casting about for viable mobile browser strategy,” October 7, 2008, <http://arstechnica.com/old/content/2008/10/microsoft-casting-about-for-viable-mobile-browser-strategy.ars>.

¹⁴ Ars Technica, “Windows Phone 7 Series in the Enterprise: not all good news,” March 16, 2010.

¹⁵ N.Y. Times, “Big Cellphone Makers Shifting to Android System,” October 25, 2009; The Inquirer, “Palm dumps Windows Mobile,” September 18, 2009; Ubergizmo.com, “Acer to Increase Focus on Android,” November 27, 2009.

¹⁶ Microsoft press release, “Microsoft Ushers in the Next Generation of the Social Phone With KIN, a New Windows Phone,” April 12, 2010, <http://www.microsoft.com/presspass/press/2010/apr10/04-12NextGenSocialPhonePR.mspx>.

¹⁷ TechFlash, “Confirmed: Microsoft Kin is Dead,” June 30, 2010, http://www.techflash.com/seattle/2010/06/confirmed_microsoft_kin_is_dead.html. See also N.Y. Times, “Microsoft Calling: Anyone There?,” July 4, 2010.

¹⁸ N.Y. Times, “Microsoft Kin Discontinued After 48 Days,” June 30, 2010, www.nytimes.com/2010/07/01/technology/01phone.html.

¹⁹ Computerworld, “Ballmer: We ‘screwed up with Windows Mobile’,” September 25, 2009. See also MobileTechWorld, “Steve Ballmer wishes Windows Mobile 7 had already launched, but they screwed up,” September 24, 2009.

²⁰ Electronista, “Ballmer: Win Mobile 6.5 an unwanted stopgap,” March 5, 2009.

Street Journal interview that Microsoft had “missed a cycle” and had “execution issues from an R&D perspective.”²¹

In the face of its competitive weakness, in February 2011, Microsoft entered into a strategic partnership with Nokia, the long-standing market leader in handsets, in which Nokia will make Windows Phone its primary operating system for its mobile devices.²² Nokia’s smartphones have used the Symbian operating system, but its share of smartphone sales worldwide has steadily eroded under the Apple/Google onslaught. Phones running Symbian fell from 63.5% of worldwide unit sales in 2007 to 37.6% in 2010,²³ and market observers recently predicted that Symbian would yield its market-share lead to Android in 2012.²⁴ Under the terms of the deal, Microsoft paid Nokia more than \$1 billion to launch the partnership. Nokia in turn will pay Microsoft a per-handset fee for the use of Windows Phone 7.²⁵

The Nokia alliance may allow Microsoft to compete more effectively with Apple and Google. Analysts now predict that Microsoft Phone will be the second-largest mobile operating system by 2015.²⁶ Microsoft has also recently announced agreements with ZTE, Acer, and Fujitsu under which their handsets will run the Windows Phone mobile operating system.²⁷ Whether consumers will choose to buy smartphones with a Microsoft operating system because the handset is offered by Nokia or these other OEMs remains an open question.

²¹ Wall Street Journal, “Ballmer Aims to Overcome Mobile Missteps,” October 3, 2010.

²² Microsoft press release, “Nokia and Microsoft Announce Plans for a Broad Strategic Partnership to Build a New Global Mobile Ecosystem,” February 11, 2011, <http://www.microsoft.com/presspass/press/2011/feb11/02-11partnership.msp>.

²³ Gartner Group, “Gartner Says Worldwide Smartphone Sales Reached Its Lowest Growth Rate With 3.7 Per Cent Increase in Fourth Quarter of 2008,” March 11, 2009; Gartner Group, “Gartner Says Worldwide Mobile Device Sales to End Users Reached 1.6 Billion Units in 2010; Smartphone Sales Grew 72 Percent in 2010,” February 9, 2011.

²⁴ Gartner Group, “Gartner Says Android to Command Nearly Half of Worldwide Smartphone Operating System Market by Year-End 2012,” April 7, 2011.

²⁵ Bloomberg Businessweek, “Microsoft Is Said to Pay Nokia More Than \$1 Billion in Deal,” March 7, 2011, <http://www.businessweek.com/news/2011-03-07/microsoft-is-said-to-pay-nokia-more-than-1-billion-in-deal.html>.

²⁶ Gartner Group forecasts a 19.5% share for Microsoft in 2015, while IDC predicts a 20.9% share. See Gartner Group, “Gartner Says Android to Command Nearly Half of Worldwide Smartphone Operating System Market by Year-End 2012,” April 7, 2011. See also IDC press release, “IDC Forecasts Worldwide Smartphone Market to Grow by Nearly 50% in 2011,” March 29, 2011, <http://www.idc.com/getdoc.jsp?containerId=prUS22762811>; N.Y. Times, “Microsoft + Nokia = a Challenge for Apple,” April 2, 2011, http://www.nytimes.com/2011/04/03/business/03digi.html?_r=1&scp=1&sq=Microsoft%20Nokia&st=cse.

²⁷ Microsoft press release, “Microsoft President Announces New Partner Benefits and Underscores Opportunity With Windows Phone ‘Mango,’” July 12, 2011.

Public statements about the Nokia-Microsoft deal made by both companies raise another possible motivation for the deal (and in turn, the effect it might have on competition in mobile operating systems). The companies have announced that they intend to use their patents in a joint offensive effort against “infringing” users,²⁸ suggesting that the deal was motivated by a strategy of forming an offensive patent pool. There are pro-competitive reasons for forming a patent pool. Often, however, a patent pool can have anticompetitive effects. Sorting the pro-competitive from the anticompetitive requires a careful investigation of why the patents would be more valuable used together than they would be used independently. Because Microsoft and Nokia have made public statements that they intend to use their patents offensively, and because Microsoft has targeted Android, which it deems its primary competitor, this arrangement raises antitrust concerns that warrant investigation.²⁹

2. Microsoft Has Failed to Compete Effectively in Tablets.

Microsoft is currently even less competitive in tablets despite more than a decade of investment in operating system software for tablet computers. Just as with smartphones, the fact that Microsoft is not an important player in tablet computing can be traced to its failure to provide innovative, compelling products to consumers.

The tablet computer is not a new idea. Indeed, Microsoft, imitating earlier tablet offerings by GO and others that built on the tablet concept suggested by Alan Kay in 1968, first proposed development of a tablet PC in 2000.³⁰ Microsoft’s efforts, however, have failed to make it a player in this segment. Tablet PC products based on the Windows operating system have had little marketplace success outside specific, narrow niches such as transportation and healthcare.³¹ One industry analyst observed in 2010 that Microsoft’s efforts to deliver a tablet

²⁸ Foss Patents, “Implications of Nokia’s new strategy for the smartphone patent wars,” February 11, 2011, <http://fosspatents.blogspot.com/2011/02/implications-of-nokias-new-strategy-for.html>. See also GigaOM, “Why Nokia deal with Apple may spark mobile patent war,” June 14, 2011, <http://gigaom.com/2011/06/14/why-nokia-deal-with-apple-may-spark-mobile-patent-war>.

²⁹ The Droid Guy, “Nokia CEO: Android Is Our Main Competition, S&P Lowers Ranking,” March 30, 2011, <http://thedroidguy.com/2011/03/nokia-ceo-android-is-our-main-competition-sp-lowers-ranking/>.

³⁰ Microsoft press release, “Microsoft demonstrates Tablet PC Technology for Enterprise Computing Applications,” Nov. 13, 2000; N.Y. Times, “Microsoft Brings In Top Talent To Pursue Old Goal: The Tablet,” August 30, 1999.

³¹ CNET News, “Apple’s iPad touches a nerve in Redmond,” January 27, 2010, http://news.CNET.com/8301-13860_3-10442060-56.html.

have “repeatedly bombed over the best part of a decade.”³² Microsoft first released a Tablet PC targeted at “corridor warriors” in 2002 that was poorly received,³³ and subsequently proposed an ultra-mobile PC (“UMPC”) in 2005.³⁴ When released, UMPC devices were larger, slower, more expensive, and more power-hungry than planned, and Microsoft acknowledged that they would appeal only to “hard-core gadget fans.”³⁵ Another tablet PC project rumored to be under way at Microsoft in 2009, Project Courier, was cancelled in 2010.³⁶

In sharp contrast, Apple achieved widespread consumer acceptance of the iPad it first released in 2010.³⁷ Its success was based on a fundamental re-imagining of the tablet computer as a highly portable, long-lasting device with a focus on media consumption. The iPad is ideal for browsing the web, playing music, looking at photos and videos, playing games, and reading e-mail, all through a finger-based touchscreen user interface. Apple has not attempted to replicate a mouse-and-keyboard, desktop-based user interface in a smaller form factor – a failed strategy that Microsoft attempted with its Tablet PC and UMPC. The iPad does not run the Mac software Apple uses on its PCs nor does it perform the business-oriented tasks traditionally associated with PC computing. It is, in short, not just a small computer, as Steve Jobs insisted in a recent public appearance.³⁸ Apple sold 14.7 million units in 2010, and 9.3 million units in the

³² Ars Technica, “Ballmer (and Microsoft) still doesn’t get the iPad,” July, 2010.

³³ Microsoft press release, “With Launch of Tablet PCs, Pen-Based computing is a Reality,” November 7, 2002, <http://www.microsoft.com/presspass/features/2002/Nov02/11-07tabletlaunch.mspix>. See also Supersite for Windows, “Windows XP Tablet PC Edition: A Look Back,” July 15, 2011, <http://www.winsupersite.com/article/windows-xp2/windows-xp-tablet-pc-edition-139838>.

³⁴ Microsoft press release, “Q&A: Microsoft Unveils Details for Ultra-Mobile Personal Computers,” March 9, 2006, <http://www.microsoft.com/presspass/features/2006/mar06/03-09Mobile.mspix>.

³⁵ CNET News, “Reality check for the much-hyped Origami PC,” March 9, 2006, http://news.cnet.com/Reality-check-for-the-much-hyped-Origami-PC/2100-1044_3-6047643.html?.

³⁶ DailyTECH, “Microsoft ‘Courier Mini-Touch Computer Concept Revealed,” September 23, 2009, <http://www.dailytech.com/Microsoft+Courier+MiniTouch+Computer+Concept+Revealed/article16314.htm>. See also DailyTECH, “Microsoft Kills Courier Dual-screen Tablet Project,” April 29, 2010, <http://www.dailytech.com/Microsoft+Kills+Courier+Dualscreen+Tablet+Project/article18268.htm>.

³⁷ Apple press release, “Apple Launches iPad,” January 27, 2010, <http://www.apple.com/pr/library/2010/01/27Apple-Launches-iPad.html>.

³⁸ Business Insider, “Steve Jobs: Tablets Are Not PCs and Our Competitors Don’t Get It,” March 2, 2011, <http://www.businessinsider.com/steve-jobs-tablets-are-not-pcs-and-our-competitors-dont-get-it-2011-3>.

first quarter following shipment of the iPad2 in March, 2011. Gartner Group estimates sales of 47.9 million iPads in 2011.³⁹

Rival device manufacturers are scrambling to manufacture competing tablet devices. By one count, more than 60 different manufacturers will introduce competing products in 2011.⁴⁰ A variety of hardware manufacturers, including Acer, Asus, Dell, HTC, LG, Motorola, Samsung, and Toshiba, have adopted Google's Android operating system as the platform for competing media tablets they plan to ship in 2011.⁴¹ Gartner Group estimates that by 2012, Android-based tablets will capture 25% of media tablet sales, while other mobile operating systems, including QNX (Research in Motion), WebOS (Hewlett-Packard), and MeeGo (Nokia), will claim approximately 12% of sales.

Notably, Microsoft is not mentioned in Gartner's tablet sales forecast. Microsoft is reportedly planning to release a new operating system dedicated to media tablets in the fall of 2012, but has not formally announced its plans to do so.⁴² A fall 2012 release would put Microsoft two years behind Apple. Microsoft has announced that Windows 8 will run on the low-power ARM chips found in many media tablets and smartphones available today.⁴³

In addition to general-purpose media tablets such as the iPad and Samsung's Galaxy, more specialized devices that substantially overlap with tablet functionality have been a commercial success in the marketplace for some years. Amazon's Kindle e-reader was introduced in November 2007, and was quickly followed by a number of e-reader products from other vendors, including Barnes & Noble. These devices run on Android, Linux, and Microsoft

³⁹ Gartner Group press release, "Gartner Says Apple iOS to Dominate the Media Tablet Market Through 2015, Owning More Than Half of It for the Next Three Years," April 11, 2011. *See also* Bloomberg, "Apple Profit Tops Estimates on Record Sales," July 19, 2011, <http://www.bloomberg.com/news/2011-07-19/apple-s-profit-beats-estimates-on-iphone-ipad-sales-shares-surpass-400.html>.

⁴⁰ The Economist, "The Difference Engine: Send in the clones," March 11, 2011.

⁴¹ CNET News, "CES: Android Tablet Preview," December 20, 2010, http://howto.cnet.com/8301-11310_39-20026183-285/android-tablet-preview/.

⁴² CNET News, "Report: Microsoft's tablet OS not due until 2012," March 3, 2011, http://news.CNET.com/8301-10805_3-20039105-75.html. *See also* Bloomberg Businessweek, "Microsoft Said to Plan Windows Release for Tablets in 2012," March 4, 2011, <http://www.businessweek.com/news/2011-03-04/microsoft-said-to-plan-windows-release-for-tablets-in-2012.html>.

⁴³ Microsoft press release, "Microsoft Announces Support of System on a Chip Architectures From Intel, AMD, and ARM for Next Version of Windows," January 5, 2011, <http://www.microsoft.com/presspass/press/2011/jan11/01-05socsupport.mspx>.

operating systems.⁴⁴ Microsoft has not offered an e-reader product to compete with Amazon's Kindle or Barnes & Noble's Nook products.

When introduced, these devices were narrowly targeted as readers for electronic books, but manufacturers are adding a wider set of capabilities to follow-on products. For example, an updated version of Barnes & Noble's Nook Color released in April 2011 includes e-mail, support for Adobe Flash, and downloadable Nook apps and has been described as an iPad competitor and a "tablet in e-reader clothing."⁴⁵ These changes make the e-reader a closer substitute for tablet computers.

C. Mobile Devices Present a Nascent Threat to Microsoft's Monopoly in PC Operating Systems.

Mobile devices represent a clear, if nascent, competitive threat to Microsoft's Windows PC monopoly. This threat is currently particularly significant for individual users. Consumers who use their PCs primarily for email, Internet access and media now have increasingly good substitutes that do not rely on Microsoft operating systems. Tablets, for example, are attractive compared to PCs because they deliver "a richer experience around content consumption," and offer desirable characteristics for users engaged in social networking. For users who particularly value mobility, tablets and smartphones offer reduced power consumption, all-day battery life, and lighter weight. Tablet computers are the mobile device most similar to PCs, but the extent to which users rely on smartphones for search, email access and other "PC-like" functions implies that these devices also have the potential to reduce demand for PCs.

Mobile devices are unlikely to replace the personal computer in the short run, but analysts note that tablets already serve as a substitute for some PC users. A Nielsen survey of tablet owners found that 32-35% of tablet owners who also own a PC reduced their PC use after purchasing a tablet. Further, 77% of tablet owners used tablets for tasks they would have previously performed with a laptop or desktop computer.

⁴⁴ Digital Book Readers, "Top 3 Operating Systems for E-Readers," January 12, 2010, <http://www.digital-book-readers.com/top-3-operating-systems-for-e-readers/>.

⁴⁵ See BN.com, nook color, <http://www.barnesandnoble.com/nookcolor/index.asp>. See also MobileBeat, "Nook Color takes on iPad with possibly 3M units shipped," March 28, 2011, <http://venturebeat.com/2011/03/28/nook-color-3m-shipped/>; MobileBeat, "Confirmed, Nook Color getting apps, tablet features with update," March 25, 2011, <http://venturebeat.com/2011/03/25/nook-color-tablet-features/>.

As would be expected from this substitution pattern, tablet sales appear to have reduced PC sales. Within the PC segment, mobile PCs for consumers have led PC sales growth over the past five years,⁴⁶ but growth in this segment fell during the first quarter of 2011 while tablet sales surged.⁴⁷ Acer, the industry's leading supplier of netbook computers – the “nearest neighbor” among PCs to tablet computers – has been particularly hard hit. Its U.S. unit shipments fell 42% in the U.S. and 16% globally in the first quarter of 2011, and Acer's management has publicly identified tablets as the cause.⁴⁸

Microsoft's failure to innovate successfully in mobile operating systems has meant that it has been unable to take advantage of a growth opportunity. With its failure to compete effectively in mobile operating systems, Microsoft has not only missed a profitable business opportunity but has given rivals and new entrants an opportunity to challenge its Windows PC monopoly.

IV. Microsoft's Current Conduct in Asserting Patents Against Barnes & Noble Appears to be Anticompetitive and Part of a Larger Campaign Against the Open-Source Android Operating System.

Unable to compete in mobile operating systems and observing the success of competing systems that have the potential to undercut its monopoly in PC operating systems, Microsoft is apparently now engaging in an “industry-wide” patent offensive against the Android operating system.

I understand that Microsoft contacted Barnes & Noble in early 2010 to discuss “patent issues” relating to Barnes & Noble's Nook products. Microsoft alleged that Barnes & Noble NookTM and Nook ColorTM e-readers infringed certain Microsoft's patents. During that discussion and in subsequent discussions between Microsoft and Barnes & Noble, I am informed that Microsoft claimed that its patents allow it to control the entire Android operating system. In addition, Microsoft insisted that Barnes & Noble sign a non-disclosure agreement (“NDA”) to

⁴⁶ Gartner Group, “Gartner Lowers PC Forecast as Consumers Diversify Computing Needs Across Devices,” March 3, 2011.

⁴⁷ Gartner Group, “Gartner Says Worldwide PC Shipments in First Quarter of 2011 Suffer First Year-Over-Year Decline in Six Quarters,” April 13, 2011.

⁴⁸ Asymco, “First Quarter PC Forecast: Windows Down 2%, Mac + iPad up 250%,” April 14, 2011, <http://www.asymco.com/2011/04/14/first-quarter-pc-forecast-windows-down-2-macipad-up-250>.

cover any discussions between the two parties even though Barnes & Noble claimed that the patents at issue were public information. Further, based on representations from Barnes & Noble, the licensing agreement that Microsoft proposed to Barnes & Noble limited, restricted or entirely eliminated Barnes & Noble's ability to upgrade or improve its Nook products. Indeed, Barnes & Noble describes the proposed licensing agreement as prohibiting it from incorporating innovative features into its Nook products, features unrelated to the patents at issue, without negotiating a new license fee with Microsoft. Microsoft also reportedly requested that Barnes & Noble pay a per unit fee that is higher than any reasonable rate for minor product features. Barnes & Noble has represented to me that the per-device fees demanded by Microsoft are the same or higher than those that Microsoft requires for OEMs licensing Microsoft's entire mobile operating system, Windows Phone 7. Because Barnes & Noble refused to sign a licensing agreement that it believed would have severely restricted its ability to innovate and required it to pay Microsoft a licensing fee for an entire operating system, Microsoft brought litigation against Barnes & Noble for its use of the Android operating system for its Nook products.

Moreover, Microsoft's conduct against Barnes & Noble has not occurred in isolation, but appears to be part of a larger Microsoft campaign against Android. Microsoft has acknowledged that it has an "industry-wide" licensing strategy aimed at the Android operating system.⁴⁹ Microsoft's "industry-wide" program would require each OEM supplying Android-based mobile devices to make payments to Microsoft for each device shipped that contains an Android operating system. This program is reminiscent of Microsoft's per-processor license agreements for MS-DOS that resulted in a consent decree with the Government in 1995.

Indeed, Microsoft has apparently decided to use its patents to demand that manufacturers of an Android-based mobile device take a license from Microsoft and pay a licensing fee for the entire Android operating system similar to what Microsoft charges for a Windows Phone 7 license. If a manufacturer refuses to pay Microsoft a license fee for the entire Android operating system, it does so with the knowledge that Microsoft has not hesitated to pursue litigation against

⁴⁹ "The Android platform infringes a number of Microsoft's patents, and companies manufacturing and shipping Android devices must respect our intellectual property rights. To facilitate that we have established an industry-wide patent licensing program for Android device manufacturers." – Statement of Horacio Gutierrez, Microsoft Corporate Vice President and Deputy General Counsel, BGR, "Microsoft sues Barnes & Noble, Foxconn over Android eReader," March 21, 2011, <http://www.bgr.com/2011/03/21/microsoft-sues-barns-noble-foxconn-over-android-e-reader>.

such manufacturers. For example, Microsoft is currently suing Motorola with respect to patents allegedly infringed by the smartphone products supplied by them.⁵⁰ My understanding is that these suits are based on the claim that Microsoft owns patents that are infringed by the Android operating system that is provided free of charge by Google and used in at least some of the mobile devices supplied by these firms. News reports also indicate that Microsoft recently demanded that Samsung pay a \$15 license for each smartphone handset it makes that uses the Android operating system.⁵¹

Additionally, as noted in Section III above, Microsoft recently entered into an agreement with Nokia, one of the largest suppliers of smartphone handsets and the holder of over 10,000 patents, whereby the two companies will pool their patents to be used offensively. One of the main intents of Microsoft and Nokia in signing this agreement may be to form a patent pool that will be used to assert an even broader set of patents against the Android operating system or the devices that use the Android operating system.⁵²

Further, Microsoft recently led groups of companies in attempts to purchase two patent portfolios each of which has the potential to be used offensively against Android. The first, Novell's patent portfolio, was purchased by CPTN Holdings, a consortium originally led by Microsoft.⁵³ Novell's patent portfolio was intimately connected with open source Linux software. The U.S. Department of Justice intervened before Microsoft was able to acquire any of the Novell patents. The Department noted that the deal could have "jeopardize[d] the ability of open source software, such as Linux, to continue to innovate and compete in the development and distribution of server, desktop, and mobile operating systems, middleware, and virtualization

⁵⁰ CNET News, "Aiming at Android, Microsoft sues Motorola," October 1, 2010, http://news.cnet.com/8301-13860_3-20018305-56.html.

⁵¹ Reuters, "Microsoft wants Samsung to pay smartphone license: report," July 6, 2011, <http://www.reuters.com/article/2011/07/06/us-samsung-microsoft-idUSTRE7651DB20110706>.

⁵² The CEO of Nokia stated that "Microsoft plus Nokia has a remarkably strong intellectual property portfolio. That is something that we will use appropriately within the context of our ecosystem, which means both defending the ecosystem from outside attacks as well as appropriately ensuring that the value that we have created through out patents are properly collected from other people who may choose to take advantage of that technology." "Nokia Conversations: Q&A videos, break down," <http://conversations.nokia.com/2011/02/22/opne-letter-from-ceo-stephen-elop-nokia-and-steve-ballmer-microsoft>.

⁵³ PCWorld, "Microsoft Purchasing 882 Novell Patents," November 22, 2010, http://www.pcworld.com/businesscenter/article/211366/microsoft_purchasing_882_novell_patents.html.

products.”⁵⁴ Second, another Microsoft-led group recently agreed to purchase Nortel’s patent portfolio of more than 6,000 patents for a “staggering” \$4.5 billion.⁵⁵ While I am not familiar with the specifics of Nortel’s portfolio, such an acquisition by Microsoft has the potential to be used offensively against Android. Indeed, by its own admission, Microsoft already has “a worldwide, perpetual, royalty-free license to all of Nortel’s patents that covers all Microsoft products and services, resulting from the patent cross-license signed with Nortel in 2006.”⁵⁶ Given existing rights to use these patented technologies, the reason Microsoft is interested in acquiring the patents themselves would seem to be to assert the Nortel patents affirmatively against others. Further, the Microsoft-led group outbid Google by five times Google’s offer price of \$900 million. Google noted following the patent auction that Microsoft’s purchase of the patents “is disappointing for anyone who believes that open innovation benefits users and promotes creativity and competition.”⁵⁷

Taken together with Microsoft’s “industry-wide” licensing program, litigation based on trivial and outmoded patents, the Nokia agreement and the CPTN transaction, the Nortel patent deal may have anticompetitive effects for mobile operating systems. Further, as demonstrated below, Microsoft has a pattern of attempting to harm competition and innovation when it cannot compete by offering better products at better prices. This conduct has been found to be anticompetitive by the antitrust authorities and the courts and has occurred in circumstances parallel to those currently faced by Microsoft with respect to mobile operating systems.

V. Microsoft’s Current Conduct With Respect to Mobile Operating Systems, Particularly Its Actions Against Android, Parallels Its Prior Anticompetitive Conduct Related to MS-DOS and Browsers.

Microsoft’s current conduct in mobile operating systems parallels its prior conduct when faced with a nascent technology that posed a threat to its PC operating system monopoly. In the

⁵⁴ U.S. Department of Justice, “CPTN Holdings LLC and Novell Inc. Change Deal in Order to Address Department of Justice’s Open Source Concerns,” April 20, 2011, <http://www.justice.gov/opa/pr/2011/April/11-at-491.html>.

⁵⁵ Forbes.com, “Nortel patents sell for staggering \$4.5 billion,” July 1, 2011, <http://billionaires.forbes.com/article/0deg3o0fii4Sy?q=Microsoft+Corporation>.

⁵⁶ ZDNet, “Will Microsoft try to outbid Google for Nortel’s patents?”, April 4, 2011, <http://www.zdnet.com/blog/microsoft/will-microsoft-try-to-outbid-google-for-nortels-patents/9088>.

⁵⁷ Tech Crunch, “Google Responds to Nortel Patent Loss: ‘The Outcome Is Disappointing’,” July 1, 2011, <http://techcrunch.com/2011/07/01/google-nortel-patents/>.

past, Microsoft has responded to such threats with anticompetitive conduct that exploited its dominant position in PC operating systems to stifle competition. The latest threat to Microsoft comes from the Android mobile operating system, and Microsoft's efforts at innovation appear to have failed. Assuming that Barnes & Noble's characterization of Microsoft's patents and its use of those patents is correct, Microsoft has again turned to anticompetitive tactics to defeat a new threat to its dominant position.

Given the historical parallels between Microsoft's prior conduct and its current conduct in mobile operating systems, it is useful to quickly review some history to provide further insight into Microsoft's current strategy for attacking Android. In the recent past, when faced with an actual or potential threat to its dominance, Microsoft has attempted to reduce competition. This pattern of conduct includes at least two sets of events: (1) the operating system threat to Microsoft's MS-DOS operating system in the late 1980s, and (2) the browser and Java threat to Microsoft's Windows 95 operating system in the mid-1990s.

A. Microsoft Responds to the OS Threat With Anticompetitive Conduct.

In the late 1980s, Microsoft's MS-DOS was the dominant PC operating system. MS-DOS had the same advantages of incumbency and network effects that later protected its Windows product. "Network effects" is a general term used to describe a phenomenon in which the use of some product becomes more valuable to an individual user when more users adopt it. As a result of Microsoft's incumbency and network effect advantages, competition against MS-DOS was effectively barred to any standalone operating systems product that might seek to replace the dominant MS-DOS standard. That did not, however, preclude potential entrants from attempting to use other strategies to compete with MS-DOS and that possibility created concern within Microsoft, leading it to create additional entry barriers.

One entry strategy pursued by potential entrants was to market a product that could compete within the MS-DOS standard as a "clone" of MS-DOS. A clone product would not need to replace the MS-DOS standard and therefore would not be impeded by the network effects that made replacing the standard so difficult. The cloning strategy had proven to be very successful in the PC industry of this era. In fact, clones of IBM's standard PC offered by competing OEMs had created intense competition in PC hardware. Similarly, in operating systems, Microsoft had become a competitor for PC operating systems by buying a clone of an

operating system supplied by Digital Research. Because cloning can be an effective entry strategy, Microsoft had reason for concern when Digital Research in turn marketed an MS-DOS clone called DR-DOS at the turn of the decade.

A second entry strategy of concern to Microsoft at that time was that sellers of complementary applications might use their customer relationships with PC buyers to enter the OS business or to form an alliance with an OS firm other than Microsoft. This strategy would be attractive to participants in the PC ecosystem because it would limit the share of the PC rents Microsoft could capture through its monopoly power. One kind of firm that might have been able to successfully sponsor a competing OS was a firm currently selling a widely successful application to PC customers. A likely candidate at the time was WordPerfect Corporation, which sold the market-leading WordPerfect word processing application.

Another similar threat faced by Microsoft came from important innovations in complementary markets. When such innovations lead to new ways to use PCs or permit new kinds of PC applications, they can weaken the entry barriers associated with established network effects. One such complementary innovator was Novell, whose Network Operating System (Netware) had the potential to enable new, network-based applications and permit new uses of PCs. This was a potential competitive threat in which many end user applications would be network centric – as they are today – rather than run primarily on the PC, as they did at that time.

Faced with the problem of potential entry from cloners – including the firm against which Microsoft had earlier entered as a cloner – and from strong, innovative suppliers of popular complementary software, Microsoft turned to buttressing the entry barriers that arise from network effects by constraining distribution and restricting innovation by independent software vendors (ISVs).

First, Microsoft required PC OEMs to sign a so-called “per processor license” agreement as a condition for installing MS-DOS on any computer sold by the OEMs. Under the per-processor license, an OEM would pay Microsoft a fee for each PC it sold, whether or not that particular PC had MS-DOS installed on it when sold. This was accurately characterized by FTC Bureau of Competition head Tom Campbell as one of the most nakedly anticompetitive contracts ever seen. This contract directly imposes costs on customers, the OEMs, for using the product of a Microsoft competitor. If an OEM installed DR-DOS rather than MS-DOS, for example, it

would have to pay Microsoft as well as Digital Research. The payment to Microsoft when a competitor's OS was installed was not linked to any value provided by Microsoft to the customer. Rather, it was effectively a tax on competitors that Microsoft could impose because it was the dominant supplier of PC operating systems. No OEM could compete for PC buyers without offering some PCs on which MS-DOS was installed. As a result, no OEM could refuse to pay the Microsoft tax on competition. For an OEM to be willing to install DR-DOS on a new machine, its supplier would have to reduce the price of the operating systems enough to reimburse the OEM for the payment to Microsoft.

In defense of its anticompetitive conduct, Microsoft alleged that the per-processor license was a reasonable mechanism to prevent users from violating its copyrights. Under this theory, Microsoft claimed that when an OEM shipped a PC without MS-DOS installed, the end customer would install an illegal copy of MS-DOS on the computer thereby evading paying for the OS. This theory gained considerable credence in policy circles, despite the fact that brief consideration of the OEM business quickly reveals it as specious. First, the OEM business was extremely competitive, and firms other than those under contract with Microsoft could have supplied the "bare" machines on which illegal copies of the OS could have been installed. Thus, the contractual restriction imposed by Microsoft could not have accomplished its alleged goal. Second, the leading OEMs did not compete by selling bare "boxes" but rather by providing fully configured, easy-to-use machines.

A second strategy used by Microsoft in that era was to compel ISVs to sign very restrictive NDAs as a condition of getting information about how to write applications that could interact with MS-DOS. These NDAs restricted the ISVs from entering the OS market themselves or from working with another ISV with a competing OS. The pro-competitive purpose of protecting confidential information was used as a cover for anticompetitive terms.

These strategies have clear analogues in Microsoft's conduct as described by Barnes & Noble today. Requiring an OEM to pay a tax (license fee) for every handset on which a competitor's product (Android) is installed is directly comparable to the "most nakedly anticompetitive contract ever seen" that required a per-processor fee. Similarly, Microsoft's requirement that Barnes & Noble sign an NDA to discuss publicly available information

parallels Microsoft's use of overly restrictive NDAs associated with MS-DOS to stifle competition.

B. Microsoft Responds to the Browsers and Java Threats with Anticompetitive Conduct.

Microsoft's "per processor license" agreements for MS-DOS and its restrictive NDAs were not the only prior instances in which Microsoft sought to block the innovation of actual or potential competitors.

By the early 1990s, Microsoft had a monopoly in PC operating systems. Its Windows product line was the dominant PC operating system and nearly all PCs ran on Windows. While a small share of personal computers ran the MacOS from Apple, and a few exceptionally adept personal computer users relied on some version of UNIX, the world of personal computing for consumers and enterprises was a Windows PC world. Individual computer users were particularly captive to Microsoft's operating system dominance. Whereas enterprises could substitute to mainframes or servers, either of which might use some non-Windows OS, for at least some computing needs, individuals had no good substitute for PCs. Unlike the situation facing Microsoft today, the smaller devices available at the time, such as the Newton or the Palm Pilot, did not materially affect the demand for PCs.

Further, network effects again created very high barriers to entry for any competing operating system. In PCs, users want to use an OS that enables them to use applications (like spreadsheet and word processing programs) that are compatible with those used by others. Users also want to use an operating system that has many available applications. ISVs that develop applications want to write applications that run on the most popular operating system. As Windows became the dominant PC operating system, more users adopted it and more ISVs developed applications for it, reinforcing its dominant position. In the 1998 antitrust action against Microsoft brought by the U.S. Department of Justice and twenty state attorneys general, the network effects that created high barriers to entry were called the "applications barrier to entry."⁵⁸

⁵⁸ See Findings of Fact, *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9 (D.D.C. 1999) (98-1232) ("Findings of Fact"), <http://www.usdoj.gov/atr/cases/f3800/msjudge.pdf>, ¶¶36-52.

The threat to Microsoft's monopoly position in this period, however, came not from a competing operating system supplier but from a fundamental change in computing. Independent inventors, including academics, entrepreneurs, and large companies, developed a set of important technologies which would transform and extend mass market computing. Today, we call this collection of technologies "the Internet," a label that encompasses a wide range of technologies, including parts of telephony, the worldwide web, and, most importantly for Microsoft, new ways for users to acquire the functionality that had been the sole province of the PC and Windows. In particular, the Internet browser created an avenue for applications that were OS independent and Java provided a way for developers to create OS-independent applications.

These new technologies were mostly organized as open-system platforms and therefore facilitated interoperability of complementary software and hardware supplied by competing firms. As a result, there was an open invitation for both new entrepreneurial firms and existing firms, such as Microsoft, to participate in the invention of a new, network-oriented form of mass-market computing. The capabilities of Microsoft's products before Bill Gates called out the importance of Internet computing in his now-famous "Internet tidal wave" memo suggest that Microsoft gave little attention to the emerging importance of Internet-based computing.⁵⁹ The widespread use of the Internet was driven by other firms.

Microsoft's position changed radically in the spring of 1995, when Microsoft realized that there was a threat to its dominant position in mass-market computing as a result of the network-centric innovations by others. Microsoft launched a broad, concerted effort to catch up with the early innovators and to become the technological leader. But the central locus of the competitive challenge was in technologies, such as the browser and Java, where Microsoft lacked both products and a technological base. The firm found itself far behind in a number of new standard-setting races, including the race that became known as the "browser war."

Microsoft threw enormous resources into competition with the more Internet-oriented firms, and in browsers it succeeded in developing and improving its Internet Explorer. It was, however, unable to develop a product that could compete with its new competitors on

⁵⁹ See Memo from Bill Gates to Microsoft staff "The Internet Tidal Wave," May 26, 1995, <http://www.justice.gov/atr/cases/exhibits/20.pdf>.

technological merit. In the end, Microsoft won the browser war by imposing anticompetitive restrictions on the ability of its new competitors to gain widespread distribution. But for those restrictions, Microsoft could well have lost the browser war, and would have been at risk that new and effective competition would undercut its Windows monopoly.

Microsoft used a variety of anticompetitive tools in its attempt to stop the commercialization of innovation by its competitors. For example, it offered to split the browser market with Netscape, ceding to Netscape markets for browser software on certain hardware platforms in return for Netscape's agreement not to market a browser for PCs running Microsoft's Windows 95 operating system.⁶⁰ But the most effective of Microsoft's anticompetitive tools were restrictions on the distribution of competing browsers. Microsoft, for example, was able to almost entirely exclude Netscape's browsers from distribution with new PCs through contractual restrictions it imposed on the OEMs making and selling Windows and Macintosh personal computers. These contracts required OEMs to bundle Internet Explorer with every PC and charged a higher price for its Windows operating system – effectively imposing a tax on the OEM – for every PC that also included Netscape Navigator. Because an OEM would be willing to include Netscape Navigator only if Netscape absorbed the cost of the tax, this was effectively a tax Microsoft imposed on a competing product. Netscape browsers were also excluded almost entirely from distribution through Internet Service Providers (ISPs) who offered the second most important distribution channel for browsers. Microsoft paid ISPs to distribute its browser rather than Netscape's to avoid, in the words of a Microsoft executive in open court, “losing side by side product comparisons with Netscape.”⁶¹ Ultimately, the browser war was won by Microsoft not because of superior products but because of restrictions on the distribution of Netscape's products. Once the browser war was won, the competitive threat to Window receded.

Microsoft also undertook other anticompetitive strategies to preserve its Windows monopoly that, while less effective than restricting distribution, were also aimed at preventing competition. ISVs were contractually banned from working with technologies Microsoft viewed as part of the competitive threat. Since the entrants creating the new, network-centric computing

⁶⁰ Findings of Fact, ¶ 83.

⁶¹ See Plaintiffs' Joint Proposed Findings of Fact (Redacted), *United States v. Microsoft Corp.*, <http://www.justice.gov/atr/cases/f2600/2613overview.pdf>, p. 1.

paradigm consisted of an open-systems cluster of firms, denying them the opportunity to work with existing ISVs (and suppliers of other complementary technology) struck at the core logic of the entrants' strategy.

There is a serious debate among economists as to the merits of open-systems competition and competition among closed, sponsored platforms as models for organization of platform industries. Economists largely agree, however, that customers and society as a whole will realize greater benefits from open-systems competition when important innovations will arise from exploring a new area that will yield new applications and new users. The development of the Internet was just such an opportunity for exploration. The open-systems approach of the firms that pursued a network-centric approach to mass-market computing – most notably Netscape, Sun Microsystems, and the numerous technology firms interested in development of Java-based applications – was therefore well-suited to the task. Today, the mobile arena, populated by smartphones, tablets and media readers from a wide variety of companies, and by applications and infrastructure software from an even wider variety of companies – from the smallest entrepreneurs to some of the largest and most successful companies in the world – is similarly ripe for exploration. As in the early days of the Internet, there is now substantial uncertainty about how mobile technologies and the use of those technologies will evolve. It is a time of exploration, and open systems like the Android operating system are an appropriate response to the challenge of innovation in mobile operating systems.

Furthermore, even those who claim that closed, proprietary architectures are superior note that they have different performance characteristics than those of open systems. They invent different kinds of things. In a time of uncertainty about the future direction of innovation, society would be very well served to have a competitive innovation race between an open-systems approach and a closed, proprietary architecture. Microsoft's attack on the open-systems Internet entrepreneurs denied society that valuable heterogeneous competition among innovators. An attack on open-systems innovation today would once again reduce the heterogeneity of innovative efforts, an outcome that is clearly bad for society if open and closed systems provide different innovations to society (regardless of whether or not one is superior to the other).

All the anticompetitive strategies embraced by Microsoft in the 1990s attacked the fundamental premise of entry and competition by open-systems firms. Netscape's Navigator

browser and Sun's Java development language could only succeed if a large number of firms worked with them. Only if OEMs put these technologies on PCs, only if ISPs distributed them, only if developers wrote applications that worked with them could these technologies be commercially successful. Attracting a wide variety of hardware and software developers to supply complementary products is critical to the success of open systems innovation. Absent collaborators, open systems platforms are unlikely to be able to compete.

Using contracts rather than technology, Microsoft succeeded in blocking not only widespread distribution of these new technologies, but also widespread collaboration with them. Today, we see the same assault on open-source software in mobile operating systems. Unable to compete with mobile operating systems like Android on the merits, Microsoft is seeking to prevent third parties – handset manufacturers, for example – from working with the open-source software by imposing prohibitively expensive costs on those manufacturers.

Microsoft has attempted to frame its attack on Android as a simple matter of exercising its intellectual property rights, claiming that its ability to exercise its patent rights is essential to its ability to innovate. This argument echoes its claim that the Government was restricting its “freedom to innovate” when it blocked (or attempted to block) Microsoft's contractual assault on the new, Internet-centric model of computing. Now, as it did then, Microsoft wraps itself in the mantle of “innovation,” this time saying that as a patent holder it has the right to prevent or heavily tax the innovation of others. Now, as it did then, Microsoft seeks to block competing innovators from working with the complementors that are essential to the commercial success of the new platform.

VI. Conclusion.

Microsoft has failed to compete effectively in the rapidly growing business of mobile operating systems. Its failure to compete has deprived it of the ability to participate in a new, vibrant and profitable business, and because Microsoft has been unable to compete in mobile operating systems, other companies have begun to develop and commercialize technologies that have the potential to erode Microsoft's monopoly in PC operating systems. In particular, manufacturers' adoption of the open source Android operating system poses a substantial, possibly the greatest, threat to Microsoft's PC monopoly. While it may be premature to view PC

operating systems and mobile operating systems as interchangeable, these systems have the potential to converge as the technology of mobile operating systems continues to advance and as consumers substitute consumption of mobile device services for PC services. Therefore, the threat that Microsoft faces from Android and other mobile operating systems should be viewed through the prism of Microsoft's larger fear that Android will erode its monopoly in PC operating systems.

Additionally, Microsoft's conduct toward Barnes & Noble, including the demand that Barnes & Noble pay a per-device licensing fee for the entire Android operating system similar in magnitude to the Windows Phone licensing fee based on the assertion of trivial patents, parallels Microsoft's prior anticompetitive conduct vis-à-vis competing operating systems and other technology firms that threatened its monopoly in operating system software. As in the past, Microsoft has not hesitated to engage in anticompetitive conduct to maintain its monopoly in PC operating systems, a monopoly it has maintained for over twenty years now despite challenges from new entrants and new technologies. Microsoft's current "industry-wide" campaign targeted at manufacturers that use Android is another example of such anticompetitive conduct.

Appendix A:
Selected Publications by Timothy J. Bresnahan on Competition in High Technology Industries

1. “Creative Destruction in the PC Industry,” Chapter 4 (pp. 105-140), in Perspectives on Innovation, Cambridge University Press 2007, Stefano Brusoni and Franco Malerba, eds.
2. “Pro-Innovation Competition Policy: Microsoft and Beyond,” in the Proceedings of the Competition Policy Research Center, Fair Trade Commission of Japan Inaugural Symposium, 2003.
3. “Why the Microsoft Settlement Won’t Work,” IEEE Spectrum, September 2002.
4. (with Franco Malerba) “The Value of Competitive Innovation,” in Technology and the New Economy edited by Chong-En Bai and Chi-Wa Yuen MIT Press, 2002.
5. “A Remedy that Falls Short of Restoring Competition,” Antitrust, v 6. n.1, December 2001.
6. (with George Hay, Richard Gilbert, Daniel Rubinfeld, Lawrence White, and Bruce Owen (all former chief economists of the antitrust division)) “Brief of Economists Amicus Curiae in *US v Microsoft*.”
7. “Competition Cooperation, and Predation in Innovative Industries,” in Fighting Cartel Why and How? The 3rd Nordic Competition Policy Conference in Stockholm. Konkurrensverket, Swedish Competition Authority, September 2000.
8. (with Pai-Ling Yin) “Economic and Technical Drivers of Technology Choice: Browsers,” Annales d’Economie et de Statistique, November, 2006, Special Issue from the Zvi Griliches Memorial Conference, Jacques Mairesse and Manuel Trajtenberg, eds.
9. (with Pai-Ling Yin) “Reallocating Innovative Resources Around Growth Bottlenecks,” Industrial and Corporate Change 2010; Volume 19, Issue 5, pp. 1589-1627.
10. (with Shane Greenstein and Rebecca Henderson) “Schumpeterian competition and diseconomies of scope; illustrations from leading historical firms in computing,” forthcoming in the NBER 50th Anniversary Volume of the Rate and Direction of Technical Change, Josh Lerner and Scott Stern, eds.
11. (with Pai-Ling Yin) “Standard Setting in Markets: The Browser War,” in Standards and Public Policy, Cambridge University Press 2007, Shane Greenstein and Victor Stango, eds.