II. Microsoft Possesses Monopoly Power Over Operating Systems

14. Microsoft possesses monopoly power over operating systems for Intel-compatible personal computers.

14.1. Microsoft's monopoly power in Intel-compatible personal computers is demonstrated by its customers' lack of any commercially viable alternative to Windows and certain Microsoft conduct that makes sense only if there is a monopoly to protect. See infra Part II.A; ¶¶ 15-16.

14.2. A traditional structural analysis, which shows that Microsoft possesses a dominant market share protected by immense barriers to entry, confirms that Microsoft has monopoly power. See infra Part II.B; ¶¶ 17-32.

14.3. Microsoft's monopoly power is also evidenced by its ability to control price. See infra Part II.C; ¶¶ 33-38.

14.4. Dean Schmalensee's analysis that Microsoft lacks monopoly power is contrary to the evidence, inconsistent with his prior testimony and writings, and otherwise unreliable. See infra Part II.D; ¶¶ 39-50.

A. **Microsoft's monopoly power is established by direct evidence of its existence and exercise**

15. That Microsoft has monopoly power in operating systems is directly evidenced by the "sustained absence of realistic commercial alternatives" to Microsoft's operating system product.

    i.   Fisher, 6/1/99am, at 11:17-18.

    15.1. Microsoft's principal customers, computer manufacturers (OEMs), lack any commercially viable alternative to Windows.

        15.1.1. OEMs are the most important direct customers of operating systems. Because competition among OEMs is intense, they respond to consumer demand. OEMs thus not only are important customers in their own right, but also are surrogates for determining the commercial alternatives reasonably available to consumers.

           i.   Dr. Warren-Boulton testified that the "great majority of operating systems installed on PCs are installed on new machines by OEMs." Warren-Boulton Dir. ¶ 23; id. at ¶ 23 n.7 (noting that in 1997, 87.6% of all copies of Windows 95 were installed by OEMs).

           ii.   Professor Fisher testified: "OEMs's are, in some sense, the representative of the consumer for certain purposes. They are in competition with each other. They gain if they deliver what end users actually want. They wouldn't care about the restrictions on them if they don't think that it mattered in their dealings with consumers." Fisher, 6/2/99am, at 22:1-6.

           iii.   Dean Schmalensee conceded that "OEMs respond to consumer demand." Schmalensee, 1/25/99am, at 15:16 (sealed session).

           iv.   See also Rose Dir. ¶ 17 ("If there were sufficient customer demand for a different operating systems for personal computers, Compaq would consider licensing that operating system."); Von Holle Dep., 1/13/99, at 299:15 - 300:1 ("if viable alternative emerged" to Windows, Gateway "would evaluate" them because Gateway likes "to make sure that" its "customers are offered a . . . choice of products that become popular in the market place"); Ransom Dep.

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(played 12/16/98pm), at 71:20 - 72:4 ("If there's a product with a competitive advantage or a price advantage, frankly, we would consider it. But it has not been presented to us.").

15.1.2. OEMs uniformly testify that they lack any commercially viable

alternative to Windows:

i. The testimony of Garry Norris, former Director of Strategy and Software at IBM Personal Computer Company, vividly illustrates the absence of commercially viable alternatives to Windows. Norris testified that, "without Windows 95, you couldn't be in the P.C. business." Norris, 6/7/99am, at 66:18-20. Indeed, Norris explained, IBM concluded in the summer of 1995 that, if it did not obtain a Windows 95 license, it would "lose . . . anywhere from 30 to 90 percent" of its sales volume, and "the IBM P.C. company would be out of business" in "three to twelve months." Norris, 6/7/99am, at 65:16 - 67:18.

ii. The testimony of Microsoft's own OEM witness, Compaq's John Rose, illustrates OEMs' dependence on Windows. Compaq preinstalls Microsoft operating systems on over 90% of its PCs, including 100% of its popular Presario line, Rose, 2/17/99pm, at 12:25 - 15:3; Rose Dir. ¶ 17 (since 1993, Compaq has "not consistently loaded any alternatives to Windows on personal computers it markets to consumers."), because Compaq has no commercially viable alternative to Windows. Rose, 2/17/99pm, at 8:16-20.

iii. Gateway's Penny Nash testified that for Gateway to stop licensing Microsoft operating systems would "be suicide." Fisher Dir. ¶ 63 (quoting Nash Dep. 11/18/97, at 5-6); see also Von Holle Dep., 1/13/99, at 298:2-23, GX 357 (sealed); Fisher Dir. ¶ 63 (quoting Brown Dep., 3/5/98, at 10-11).

iv. Other OEMs gave similar testimony: Mal Ransom of Packard Bell, a leading OEM, testified that Packard Bell pre-installs Windows on 100% of its PCs and has done so for several years. Ransom Dep. (played 12/16/98pm), at 68:14 - 69:23. Packard Bell loads Windows because it is "the only viable choice." Ransom Dep. (played 12/16/98pm), at 69:5. Frank Santos testified that Hewlett-Packard has not considered any other operating system for its consumer line of PCs "because there isn't any out there." Fisher

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Dir. ¶ 63 (quoting Santos Dep., 4/13/98, at 7-8).

15.1.3. All three economic experts in this case agreed that there is no

commercially viable alternative to Windows to which a significant OEM can switch in response

to a substantial price increase or its equivalent by Microsoft.

>   i.   Professor Fisher testified that Microsoft's power is shown by
>   evidence that "Microsoft's customers do not believe that they have
>   serious commercial alternatives to Windows." Fisher, 6/1/99am, at
>   11:9-19; see also Fisher Dir. ¶ 63.

>   ii.   Dean Schmalensee conceded that there are no reasonable
>   substitutes for Windows to which a major OEM can switch and
>   that Microsoft can raise the short-term price of Windows.
>   Schmalensee, 1/20/99am, at 33:3-8; see also 1/13/99pm, at 68:17 -
>   69:2.

>   iii. Dr. Warren-Boulton testified that OEMs consider Windows
>   "commercially necessary" and that "if confronted with a 10%
>   increase in their Windows license, they would not switch to
>   operating system products for other hardware platforms." Warren-
>   Boulton Dir. ¶ 39 (summarizing OEM testimony); Warren-
>   Boulton, 11/23/98pm, at 70:9-12 (testifying that it is
>   "commercially necessary to be able to offer Microsoft operating
>   system . . . to end users").

15.1.4. Microsoft knows that OEMs have no choice but to load Windows.

15.1.4.1. Microsoft told OEMs that they lack any alternative to

Windows and, indeed, that Microsoft was "the only game in town."

>   i.   Norris of IBM testified that Microsoft executives repeatedly
>   sought to use the fact that IBM had no "commercially
>   viable alternative" to Windows (Norris, 6/7/99am, at 66:18-
>   20), and feared losing access to Windows, to pressure IBM
>   into dropping products that competed with Microsoft. See
>   infra Part V.C.2.b.(3); ¶¶ 209-212. Indeed, Norris testified,
>   the Microsoft executive in charge of its relationship with
>   the IBM PC company bluntly told IBM during negotiations,
>   "'where else are you going to go? This is the only game in

town.'" Norris, 6/7/99am, at 66:21 - 67:6.

15.1.4.2. OEMs told Microsoft that they lack any viable

alternative to Windows.

    i.   John Romano of Hewlett Packard wrote to Microsoft, when it imposed costly screen restrictions upon Hewlett Packard, that "if we had another supplier, I guarantee you would not be our supplier of choice." GX 309.

    ii.   Gateway urged Microsoft

GX 357 (sealed).

15.1.4.3. Other operating system vendors recognize that they do

not provide a viable alternative to Windows.

    i.   John Soyring of IBM testified: "As a result of the applications and device support for Windows, in my view, suppliers of PCs have no commercially viable choice but to license Windows and to offering on the vast majority of PCs they ship." Soyring Dir. ¶ 11.

    ii.   Avadis Tevanian of Apple computer testified: "For the foreseeable future, Microsoft will maintain a market share in excess of 90 percent of the desktop operating system market, a dominance that will enable it to continue to effectively control both price and technologies." Tevanian Dir. ¶ 14.

    iii.   The CEO of Red Hat Linux also insists that Red Hat is not a viable competitor to Microsoft. In a Washington Post article he said: "'It just tells you how desperate Microsoft is for a competitor that they're holding up a software box produced by 100 guys in the hills of North Carolina.'" He also said: "'We are absolutely not a viable competitor at this time. We have every intention of being one. But how long will it take? Realistically, it will be twenty years.'" GX 1568.

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15.1.5. Microsoft set the Windows royalty recognizing that OEMs have

no viable alternative to Windows.

> i.   Joachim Kempin, Microsoft's Vice President for OEM sales, testified that the prices set by other operating system vendors were not a consideration in setting the Windows 98 royalty. Kempin, 2/25/99pm, at 97:24 - 98:23. To the contrary, Microsoft set the royalty for Windows 98 by "'compar[ing] it with Windows 95.'" Id. at 98:6 (quoting Kempin's deposition, 21:20 - 22:6); see also Kempin, 2/25/99pm, at 98:15-23 (quoting Kempin's deposition, 22:10-22:6) (Kempin also did not consider "'competition more generally'").

> ii.   Kempin testified that he did not consider the prices set by other operating system vendors because, "with Windows 95 or 98, when it comes to value propositions, it just doesn't come close to anything else. Meaning I believe competitors are basically selling inferior-type products." Competitors products are "inferior," Kempin explained, because "the number of applications, peripheral devices, support on that platform, basically, is so huge that the benefits of buying into that platform is huge." Kempin, 2/25/99pm, at 98:24 - 99:5 (quoting Kempin's deposition, 22:19-24).

> iii. Kempin, in contemplating "OEM pricing thoughts," wrote that although conceivably, "[o]ur high prices could get a single OEM . . . or a coalition to fund a competing effort," he considers it "doubtful." He concluded: "Could they convince customer to change their computing platform is the real questions. [sic]. The existing investments in training, infrastructure and applications in windows computing are huge and will create a lot of inertia." GX 365.

15.1.6.   OEMs do not believe alternatives to Windows are likely to

emerge in the next several years such that Microsoft is constrained from being able to raise price

or reduce quality today.

> i.   Garry Norris testified that without a Windows 95 license, "the IBM P.C. company would be out of business" in "three to twelve months." Norris, 6/7/99am, at 65:16 - 67:18.

ii. Professor Fisher testified that there is no reason to "believe that OEMs would substitute other operating systems for Microsoft's Windows operating system in favor of anything that can now be seen on the horizon"; that is, in "the next few years." Fisher, 1/6/99am, at 69:23 - 70:1.

15.2. Both OEMs and applications developers (ISVs) recognize that they are

dependent on Microsoft and fear that Microsoft will use its monopoly power to harm them if they

favor Microsoft's rivals.

i. When Microsoft released a Java development kit that reflected Microsoft's "breaking away from pure Java," Paul White of Symantec, an ISV, wrote that "it's better to say nothing than risk the blast from MS." GX 2078.

ii. Barry Schuler of AOL testified that, because its applications must run on Windows, "there's an absolute dependency on what the future direction of that operating system." DX 2810.

iii. William Harris testified: "Intuit's dependence on the Windows operating system creates additional dependence on the supplier of the operating system, Microsoft. We depend on Microsoft for the information, specifications, training, development assistance and development tools necessary to develop our products in an effective and timely manner." Harris Dir. ¶ 28.

iv. Hewlett Packard's John Romano testified that

DX 2582A (sealed).

v. A Compaq presentation entitled "Microsoft Meeting Preparation — Portable and Software Marketing PC Division" dated January 13, 1993, states:
The presentation continued: "Judgment: How retaliatory would they get?" and lists the possibilities as follows: "Pricing advantage — Revenue from updates — Access to early SDKs — Field sales activities (Microsoft has ~900 field sales people) — Support and training — Inclusion in advertising — Tone toward Compaq in press and with customers — Selection and elevation of other OEMs as leaders — Make integration relations even more strained than they are today —

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Access to source code, modification ownership — Microsoft directional information and plans — Customers." GX 433 (sealed).

16. Microsoft repeatedly took actions that make sense only because it has monopoly power to protect.

      i.   Fisher, 6/1/99am, at 12:14-17.

      16.1. Microsoft's expensive effort to gain browser usage share can be explained only as an effort to protect Microsoft's position in operating system and thus demonstrates substantial and durable market power.

          i.   As detailed below, Microsoft engaged in a very costly course of conduct designed to gain a substantial share of the market for Internet browsers. See infra Part V.G.

          ii.   This conduct evidences monopoly power because, as will be explained (see infra Part V.G.), Microsoft could not have expected to recoup its hundreds of millions of dollars in browser-related costs except by thwarting threats to its position in operating systems and thereby increasing or prolonging its monopoly profits in operating systems.

      16.2. Microsoft's monopoly power is also evidenced by its ability, for several years, to force other firms to cooperate in Microsoft's efforts to exclude threats to its dominant position in operating systems.

          16.2.1. This conduct includes, among other things:

          i.   Forcing OEMs to accept Microsoft's Internet Explorer browser as a condition of licensing Microsoft's Windows operating system. See infra Part V.B.

          ii.   Forcing OEMs to agree to costly restrictions on their ability to customize their PC systems; OEMs agreed to those restrictions, in the words of one executive, because they lack any "choice of another supplier." GX 309. See infra Part V.C.1.

          iii.   Threatening to retaliate against OEMs that favored products that

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threaten Microsoft's operating system monopoly. See infra Part V.C.2.

iv.   Threatening to retaliate against Intel if Intel developed platform-level software or favored Netscape or Sun in various ways. See infra Part VI.

16.2.2. This conduct is part of a predatory course of conduct that makes

no sense unless Microsoft expected it to lead to monopoly recoupment in the operating system

market. All these acts reduced the value of Windows to end users. Microsoft would not

rationally have reduced the value of Windows unless it anticipated that doing so would create or

increase monopoly power and thereby enable it to earn greater monopoly profits.

i.   Professor Fisher testified: "Microsoft has, I think, plainly taken actions which only make sense if they believe that they have a monopoly to protect. Those are, of course, the actions which are in large part the subject of this case." Fisher, 6/1/99am, at 12:14-17.

ii.   Dean Schmalensee conceded that, if a firm can impose a tie-in "that implies the firm has some power over price." Schmalensee, 1/19/99am, at 40:12-22. Dean Schmalensee also previously wrote that: "Evidence that competitors have conspired to fix prices or divide markets is treated as very good evidence that these competitors have market power" (GX 1514), and that such evidence "perhaps" could indicate "monopoly power." Schmalensee, 1/14/99pm, at 46:14 - 47:6.

iii. Dr. Warren-Boulton testified that "to the extent there is evidence . . . which shows that Microsoft has . . . used its position in the operating system market to exclude competitors from either that market or from markets that might facilitate the entry of a firm into that market, then that's direct evidence of the ability to exclude" and "that by itself is direct evidence of the existence of monopoly power." Warren-Boulton, 12/1/98am, at 32:3-20.

B.   Microsoft's monopoly power is also demonstrated by a structural analysis

17. Microsoft's monopoly power is confirmed by a traditional structural analysis, which

shows that Microsoft possesses a dominant share of a well-defined market protected by immense

barriers to entry.

> i.   Professor Fisher testified that "Microsoft's high market share is an indication that
>   it possesses monopoly power. The analysis of barriers to entry confirms that
>   monopoly power exists." Fisher Dir. ¶ 65.
>
> ii.   Dr. Warren-Boulton likewise testified that Microsoft "possesses monopoly
>   power" because it "for several years has enjoyed, and is projected for several years
>   to retain, a market share in excess of 90%," and this share "is protected by
>   substantial barriers to entry." Warren-Boulton Dir. ¶ 7.

17.1. The standard way to determine monopoly power is (1) to ascertain whether

a firm possesses a very large share of a properly defined market and then (2) to determine

whether substantial barriers to entry protect that share by impeding the ability of rivals to enter or

to expand.

> i.   Professor Fisher testified that "the ordinary way you proceed in an antitrust
>   case is to define a market and look at market shares" and then determine
>   whether there are substantial barriers to entry. Fisher, 6/1/99am, at 12:2-
>   13; see also Fisher, 6/1/99am, at 6:1-3 (explaining that this is the "standard
>   way" to determine monopoly power); Fisher Dir. ¶¶ 32-39 (testifying that
>   "monopoly power is conventionally addressed by defining 'the relevant
>   market' and assessing shares in the market share"); Warren-Boulton Dir.
>   ¶¶ 18, 42-44.
>
> ii.   Dean Schmalensee conceded that: "'The traditional and most common
>   approach in an instance where one can define a relevant market in the
>   antitrust sense'" is "'to first look at shares of that market and then if shares
>   are large, to move on to consider conditions of entry.'" Schmalensee,
>   1/13/99pm, at 24:9-25 (quoting GX 1526 (Schmalensee's testimony in
>   Bristol)).

17.2. A large share of a well-defined market protected by substantial entry

barriers warrants an inference of monopoly power.

> i.   Professor Fisher testified: "A large share of a properly defined market" is
>   indicative of the ability to exercise substantial market power, and that

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where "there are significant barriers to entry, monopoly power can be present." Fisher Dir. ¶¶ 32-36, 39.

    ii.   Dean Schmalensee conceded that, if Microsoft's Windows operating system enjoys the protection of substantial barriers to entry, then he could not conclude that Microsoft lacks monopoly power. Schmalensee, 1/14/99am, at 8:22 - 9:9.

    iii.   Dr. Warren-Boulton testified "that market share is an indicator of monopoly power. It is one of several indicators of monopoly power." Warren-Boulton, 11/19/98am, at 56:22-23.

1.   Operating systems for Intel-compatible PCs comprise a relevant market

18.   The purpose of defining markets is to determine whether substantial and durable market power can be exercised; accordingly, a properly defined relevant market should include the set of products over which a single firm, if it controlled production of those products, could exercise substantial market power.

    i.   Dean Schmalensee testified that a relevant market consists of the "smallest aggregate that could be profitably monopolized." Schmalensee, 6/24/99pm, at 58:15-23.

    ii.   Dr. Warren-Boulton testified that a properly delineated antitrust market includes the set of products over which a single firm, if it controlled production of those products, could exercise substantial market power. Warren-Boulton Dir. ¶¶ 26-32.

    iii.   Professor Fisher testified that the purpose of defining a market is to determine the "set of things that could constrain the power of the alleged monopolist." Fisher, 6/1/99am, at 9:17-24.

18.1. The relevant market thus should include only reasonable substitutes that in a reasonable period of time could constrain -- and thus defeat -- an attempt to exercise substantial market power.

    i.   Professor Fisher testified that a relevant market "should include all those products that reasonably serve to constrain the behavior of the alleged

monopolist." Fisher Dir. ¶ 32; Fisher, 6/1/99am, at 9:18-21 (stating that "in defining a market and then in examining market power, you typically look at . . . things that could constrain the power of the alleged monopolist.").

ii.   Dr. Warren-Boulton also testified that a relevant market should include substitute products that could prevent the exercise of monopoly power. Warren-Boulton Dir. ¶¶ 27-28. He further testified that it is "important not to define the market too broadly" by including products that are not reasonable substitutes, "for that might understate the power of the firm whose conduct is being examined." Warren-Boulton Dir. ¶ 28.

18.2. These include:

18.2.1. <u>Demand responses</u>. The relevant market should include products to which consumers could switch, without substantial difficulty, in response to an attempt by firms in the candidate market to exercise substantial market power.

i.   Professor Fisher testified that, in defining a market, one must look at "demand substitutability," which "concerns the question of what are the products or the firms to which the alleged monopolist's customers could readily turn in the event of an increase in price." Fisher, 6/2/99am, at 69:22 - 70:1; Fisher, 6/1/99am, at 9:21-24 ("demand substitutability" refers to "the set of products to which customers can turn in the event of an attempt to earn supernormal profits" by the alleged monopolist); Fisher Dir. ¶¶ 32-33 (same).

18.2.2. <u>Supply responses</u>. The relevant market should also include firms that do not presently produce the product in question or a reasonable substitute for it but which, without substantial difficulty, could do so in response to an attempt by firms in the candidate market to exercise substantial market power.

i.   Professor Fisher testified that, in defining a market, one must look at "supply substitutibility," which "refers to the ability of firms who do not now produce demand substitutable products, easily to produce demand substitutable products." Fisher, 6/2/99am, at 70:9-11; Fisher, 6/1/99am, at 10:8-13 (same); Fisher Dir. ¶¶ 32, 34 (same).

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19. Operating systems for Intel-compatible PCs comprise a relevant market because they lack good substitutes; that is, there are no substitutes that in a reasonable period of time could defeat -- i.e., render unprofitable -- an attempt by a monopolist over such operating systems from exercising substantial market power.

19.1. Other "platform" products, such as Internet browsers and Java, are not good substitutes for operating systems because they cannot function without an operating system.

  i.   Jim Barksdale testified: "I am not suggesting that the browser is a replacement for the operating system; Navigator still needs an operating system, such as Windows 98, running underneath it, but Navigator can and does serve as a platform for certain network-centric applications." Barksdale Dir. ¶ 82; Barksdale, 10/20/98pm, at 72-74 (Barksdale testified that while Netscape could serve as a substitute for certain platform chacteristics, he does not believe that Netscape could seriously substitute for all platform characteristics).

  ii.   James Clark, founder and former Chairman of Netscape, testified that: "Netscape is not an operating system. It's not even a networked operating system. . . . Netscape was developing a platform. A platform is not the same as an operating system. . . . The idea was to make it independent of the Microsoft operating system, but no attempt whatsoever to displace the Microsoft operating system." Clark Dep. (7/22/98) at 44:25 - 46:16 (DX 2562). Clark explained Netscape intended to provide a software layer that would run on top of otherwise incompatible operating systems and enable them to use network or web based applications, but that "layer still relied on there being some kind of machine and some kind of operating system underneath." Clark Dep. (7/22/98) at 48:5 - 49:4 (DX 2562). Clark categorically denied that Netscape intended for the browser to replace the operating systems that it relied upon. Clark Dep. (7/22/98) at 48:5 - 50:4 (DX 2562).

  iii.   Netscape's Richard Schell similarly testified that Netscape intended to be "operating system agnostics," (i.e., work well with all operating systems), but not to replace operating systems. When Microsoft counsel followed up by asking whether he regarded "the notion of Navigator replacing Windows [as] a slightly ridiculous assertion," Schell explained: "There are 14 million lines of code in Windows 9X. They must do something. For us

to have thought that we would replace all of those would have been a stretch of the imagination. We thought we could provide functionality that enhanced not only Windows but Unix and the Macintosh and . . . for some developers and some users, that would become their primary environment, but we would never think that that meant we were replacing Windows." Schell Dep. (9/15/98), at 103:17 - 104:22 (DX 2587).

iv. Dean Schmalensee testified that he is not aware of any "software that only browses and does not do anything else and requires no other software to run." Schmalensee, 6/23/99am, at 53:2-10; id. at 57:14-17 (same for other "web-based applications").

v. Professor Fisher testified: "In the present case, the growth of the Netscape browser or the widespread use of original Java might have perfectly well have broken down the applications barrier to entry and allowed other operating systems to compete. But it would be the other operating systems that were then in the market, not . . . either Netscape, the browser market, or Sun because of Java." Fisher, 6/1/99am, at 18:5-11.

19.2. Intel-compatible server operating systems are not good substitutes for Intel-based PC operating systems because they lack the features and breadth of applications users demand and are prohibitively more expensive.

i. Sean Sanders of Novell testified that server operating systems do not compete with Windows. Sanders Dep., 1/13/99pm, at 184:13 - 185:1. He further explained that to convert Novell's server operating systems into desktop operating system would require starting "all over again" and building the operating system "from the ground up." "It is not easily transferable to" the desktop "role at all." DX 2584.

ii. Sun's Brian Croll testified that Sun's Solaris operating system does not compete with Windows. Croll Dep. (played 12/15/98pm), at 56:23 - 57:13.

iii. Ron Rassmussen, of Santa Cruz Operating Systems, testified: "People are not purchasing our operating system as a desktop as much as they did at one time" and that it is "more effective for our strategy to move into a purely server role." DX 2581 (testifying that using SCO's operating system for desktop use is prohibitively expensive for users).

iv.   Paul Maritz agreed "that the applications you find on a server are different from those you find on an Intel PC acting as a desktop." Maritz, 1/27/99pm, at 28:18 - 29:1.

v.   Dr. Warren-Boulton testified that "Intel-compatible operating system products that are designed . . . to operate 'servers' are not viable substitutes for a desktop operating systems" because they "are generally more expensive yet do not provide the features consumers demand when they purchase PC operating systems." Warren-Boulton Dir. ¶ 40.

19.3.   Nor do other devices, which run other (non-Intel-compatible) operating systems, constrain the exercise of substantial market power over Intel-compatible PC operating systems.

19.3.1. A PC operating system accounts for only a very small percentage of the cost of a PC system; therefore, even a substantial increase in the price of a PC operating system above competitive levels will result in only a trivial increase in the cost of a PC computer system to users.

i.   Maritz testified that the Windows royalty is "less than 5% of the price of a typical new computer." Maritz Dir. ¶¶ 21, 132.

ii.   Professor Fisher testified that a 10% increase in the price of a PC operating system will result in only approximately 1 % increase in the price of PC. Fisher, 6/1/99am, at 27:7-25.

iii.   Dr. Warren-Boulton similarly testified that "even a 10% increase in the price of the OS would result in at most a 1% increase in the price of even inexpensive PCs." Warren-Boulton Dir. ¶ 37.

19.3.2. A common-sense economic analysis, therefore, shows that users will not in significant numbers incur the substantial costs of switching away from Intel-based PCs, and hence from Windows, in response to even a large increase in the price of the operating system.

i.   Professor Fisher testified that the "[q]uestion at issue in assessing Microsoft's power is not whether a change--an increase in the price of the P.C. as a whole would cause people to turn to other non-P.C. devices, or for that matter, to Apple," but rather "whether an increase in the operating system price will cause that to happen." Fisher, 6/1/99am, at 27:1-6. He then concludes that it will not because even a 10% increase in the price of the operating system would result in "less than a 1 percent increase in the P.C. price." Fisher, 6/1/99am, at 27:14-16.

ii.   Dr. Warren-Boulton similarly observed that "even a 10% increase in the price of the OS would result in at most a 1% increase in the price of even inexpensive PCs," and in light of "the cost to users of switching to another platform, such a small increase in the price of the PC platform would not be expected to result in a large reduction in the demand for PCs, and thus for PC operating systems." These facts led him to conclude "that PC operating systems are a separate market." Warren-Boulton Dir. ¶ 37; <u>see</u> <u>also</u> Warren-Boulton, 11/23/98pm, at 8:20-25, 9:17-25.

19.3.3. The evidence confirms that a substantial price increase for PC operating systems (a trivial increase in the price of the PC) will not result in switching away from PC systems, and hence PC operating systems, sufficient to make the substantial price increase in the operating system unprofitable.

19.3.3.1. <u>OEMs</u>. As explained, OEMs will not switch away from Windows (let alone start building other types of personal computers) in response to a substantial exercise of market power (such as increased restrictions or prices) over Intel-compatible PC operating systems.

i.   <u>See</u> <u>supra</u> ¶ 15.1.

19.3.3.2. <u>Apple</u>. The most obvious possible substitute for users are other personal computers, such as Apple's Macintosh. But even Apple — the closest

substitute to PCs — does not constrain the exercise of power over operating systems for Intel-based PCs.

      i.   Dean Schmalensee conceded that Microsoft's present operating system competitors, including Apple, are not "the primary constraint on Microsoft's pricing." Schmalensee, 1/14/99am, at 24:16-25.

      ii.   Although some users do switch from PCs to the Macintosh, Apple's Avadis Tevanian testified that Apple still cannot gain substantial share and, therefore, cannot effectively compete with Microsoft. Tevanian, 1/4/99pm, at 9:20 - 12:18.

      iii.   Plaintiffs' economists testified that consumers' switching from PCs to the Macintosh is not the result of the exercise of market power over PC operating systems and, therefore, does not show an effective constraint on Microsoft's ability to exercise substantial market power. Warren-Boulton, 11/23/98pm, at 6:18 - 15:12; see also Fisher Dir. ¶ 137 ("Apple represents the main potential alternative to desktop PCs running Microsoft's Windows. (Although that alternative is not sufficient to keep Microsoft from having monopoly power.)"); Warren-Boulton, 11/23/98pm, at 8:20-25 (testifying that if the cost of the Windows operating system increased "by a small but significant amount . . . not enough people are going to decide . . .to switch to the Mac platform" to include Mac in the market). Switching to the Macintosh simply means the value of Microsoft's monopoly is shifting, not that its monopoly power is dissipating. Warren-Boulton, 11/23/98pm, at 13:3 - 15:12 (testifying that the question is "'what is the constraint on the monopoly pricing of the operating system'" and that the "fact that demand for the product, as a whole, is increasing or decreasing is not the relevant question'").

     19.3.3.3. <u>Other information appliances</u>. There is similarly no evidence that other information appliances constrain Microsoft's ability to exercise substantial market power over operating systems for Intel-compatible personal computers.

19.3.3.3.1. <u>First</u>, most such appliances are complements to,

rather than substitutes for, personal computers, so switching is not likely.

    i.   Steve Case stated publicly and testified that: "It's hard to imagine that PCs won't be the dominant way people connect with the Internet for many years to come, and Microsoft has a pretty amazing lock on that business. . . . Other devices will emerge, but I doubt any will challenge Windows."   Case Dep. (played 6/4/99am), at 44:17 - 45:4; Ct. Ex. 1.

    ii.   AOL's Barry Schuler testified:

      Schuler Dep., 5/5/99, at 183:18-21 (sealed).

                    Schuler Dep., 5/5/99, at 183:24 - 184:12 (sealed).

    iii.   Professor Fisher testified that other devices are not presently good "substitutes for PC's. And you can perfectly well have a monopoly in operating systems for PC's, despite the fact that there are or may be a number of operating systems for hand-held devices, TV set-top boxes and so on." Fisher, 1/12/99am, at 7:14-16; Fisher, 1/12/99am, at 7:19 - 8:7. Professor Fisher further testified that other information appliances do not presently constrain Microsoft's behavior. Fisher, 6/2/99am, at 83:20-23.

iv.   Bill Gates stated that for "most people at home and at work, the PC will remain the primary computing tool; you'll still want a big screen and a keyboard" for many applications and "you'll need plenty of local processing power for graphics, games, and so on. But the PC will also work in tandem with other cool devices. You'll be able to share your data-- files, schedule, calendar, email, address book, etc.-- across different machines; and you wont have to think about it; it will be automatic." GX 2059 (Newsweek article dated 5/31/99). In a similar vein, the IDC forecasts that for PCs and other information appliances, there will be "some competition between these two categories of devices. However, it is more true that the two devices will help lift each other. As a rising tide raises all ships, the growth of the Internet as an important tool for communication, commerce, and entertainment will provide ample justification for both form factors." DX 2423, at 35.

v.   <u>See</u> <u>also</u> <u>infra</u> Part VII.D.C.3; ¶ 396.2.

19.3.3.3.2. <u>Second</u>, even if other information appliances became better substitutes for a wider range of PC functions in the future, a small increase in the price of PC systems caused by a large increase in the price of the operating system will not result in substantial switching to other information appliances. In other words, while other information appliances may affect relative ubiquity of PCs, and thus the value of Microsoft's monopoly over operating systems for Intel-based PC operating systems, those appliances do not undermine the fact that there is a market for such operating systems that is capable of being monopolized.

i.   Dr. Warren-Boulton testified that a small increase in the price of the overall computer system will not induce large numbers of users to incur the costs required to switch to other devices. Warren-Boulton, 11/23/98pm, at 14:16-23; Warren-Boulton Dir. ¶¶ 37-39.

ii.	Professor Fisher testified that, for this reason, the existence of other information appliances was "basically totally irrelevant" to the monopoly power analysis. Fisher, 6/3/99pm, at 65:1-7. "The fact that other devices are going to be important, too, is interesting, but we're not talking here, by the way, about a monopoly of PCs themselves. We're talking about a monopoly of operating systems for PCs, and to believe that this has something to do with eroding Microsoft's monopoly power in operating systems, you would have to believe that small changes in the price of the operating system for PCs would cause people no longer to buy PCs, but to ship" "these other devices." Fisher, 6/3/99pm, at 65:23 - 66:6. <u>See</u> <u>also</u> Fisher, 6/1/99am, at 27:14-22.

19.3.3.3.3. <u>Third</u>, because the issue for market definition is whether a non-trivial increase in the price of the operating system will cause switching away from PC operating systems (to other information appliances running other operating systems or otherwise) to a sufficient extent to render that price increase unprofitable, there is no need to reach the question of whether PCs themselves comprise a relevant market (that is, whether a large price increase in the cost of a PC would be rendered unprofitable by switching).

i.	Fisher, 6/2/99pm, at 30:2-13; 6/3/99pm, at 65:23 - 66:6.

20. Microsoft internal documents and the testimony at trial of its witnesses also support delineating a market for Intel-based desktop operating systems.

i.	Joachim Kempin testified, Microsoft tracks the share of "[o]perating systems for Intel PC[s]." Kempin, 2/25/99pm, at 94:24 - 95:7.

ii.	Microsoft internal documents analyze as "competition" other "x86 Os[s]" -- that is, other Intel-based operating systems -- but do not characterize as competition other types of operating systems. GX 401.

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2.   Microsoft possesses a dominant, persistent, and increasing share of the market for operating systems for Intel-compatible PCs

21.   Microsoft possesses a dominant, persistent, and increasing share of the relevant

market.

21.1. Microsoft presently enjoys a market share in excess of 90%.

i.   Data sponsored by Professor Fisher and Dr. Warren-Boulton shows that Microsoft's share of Intel-based PC operating systems is well over 90%. GX 1.

ii.   Professor Fisher testified: "Microsoft's share of personal computer operating systems is very high and has remained stable over time. Microsoft's worldwide share of shipments of Intel-based operating systems has been approximately 90 percent or more in recent years . . . . Even if operating systems for non-Intel-based computers are included in the market definition, Microsoft's share is still very high and stable." Fisher Dir. ¶ 64.

21.2. This share, which Microsoft has possessed since at least the early 1990s,

has been stable through the many changes that have occurred in the computer industry.

i.   Dr. Warren-Boulton testified: "This high market share has been remarkably stable."   Warren-Boulton Dir. ¶ 45.

ii.   Data sponsored by Professor Fisher and Dr. Warren-Boulton shows that Microsoft's share of Intel-based PC operating systems is projected to rise to 96% by 2001. GX 1.

iii.   Professor Fisher testified: "Here, Microsoft's share of the P.C. operating systems business has been high and stable for some years. Further, it's expected that it will remain high for some years." Fisher, 6/1/99am, at 12:2-8.

iv.   Microsoft North America FY96 Reviews, an internal financial report compiled in June 1996, reported that the

GX 402, at
MS6 6001734 (sealed), GX 403, at MS6 6006356 (Microsoft North
America FY97 Reviews) (sealed).

21.3. Microsoft's share is projected to rise even further in the next century.

i.   Rational Software "believes its continued success will become
        increasingly dependent on its ability to support the Microsoft platform,
        including Windows 95, Windows 98, and Windows NT operating
        systems." GX 1663 (SEC 10-Q), at 5. Mike Devlin, a Microsoft witness,
        testified that Rational's "increased dependence" on Microsoft will indeed
        be the result of "the increasing market share of the Microsoft platform."
        Devlin, 2/4/99am, at 25:22 - 26:1; Devlin, 2/4/99am, at 14:8 - 15:9.

ii.   IBM's John Soyring testified that Microsoft's 92% market share will "stay
        that high, if not get higher" in the next two or three years. Soyring,
        11/18am, 71:24 - 72:4.

iii.   Professor Frank Fisher testified: "Here, Microsoft's share of the P.C.
        operating systems business has been high and stable for some years.
        Further, it's expected that it's going to remain high for some years."
        Fisher, 6/1/99am, at 12:2-8.

iv.   Dr. Warren-Boulton testified that Microsoft's share of operating systems
        "has been above 90% since at least the early 1990s and this dominance is
        forecast through at least 2001." Warren-Boulton Dir. ¶ 45; see also
        Warren-Boulton, 11/19/98am, at 57:24 - 58:5 (referring to GX 1, which
        contains the IDC's "projections of continuous and sustained and
        increasing market shares").

v.   A report prepared for Microsoft in September 1997 states: "Win32
        penetration by household primary machines is currently 70% and projected
        to reach 90% by December 1998."   GX 447, at MS7 001195.

22. Precise calculation of Microsoft's market share or of the contours of the market is, in
any event, unimportant.

22.1. Even if one included in the market other products -- such as "middleware"
and other operating systems -- Microsoft would still possess monopoly power.

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i.   Dr. Warren-Boulton testified that "even if the market were defined more broadly to include operating system products for all personal computers--such as those offered by Apple or some vendors of UNIX based operating systems that do not use an Intel-compatible microprocessor--my conclusion that Microsoft possesses monopoly power in a relevant market would still stand." Warren-Boulton Dir. ¶ 41.

ii.   Professor Fisher similarly testified that even "if operating systems for non-Intel-based computers are included in the market definition, Microsoft's share is still very high and stable." Fisher Dir. ¶ 64.

iii. Professor Fisher testified that Microsoft possesses monopoly power even if threats to its monopoly power, such as Netscape and Java, are included in the relevant market. Fisher, 6/2/99am, at 61:11 - 62:10; 6/1/99am, at 46:12 - 47:19.

22.2. Market definition and calculation of market shares are intended only to aid

in determining whether a firm has monopoly power, so precise calculation is not necessary where

refinement and precision will not change the ultimate determination of monopoly power.

i.   As Professor Fisher testified, "there will often be no bright line between defining products as in the market" and "leaving them out while remembering that firms that do not produce them can enter fairly readily. But the lack of such a clear line will not matter, so long as one remembers that market definition need not be precise and that its purpose is to assist in analyzing the constraints on the behavior of the alleged monopolist." Fisher Dir. ¶ 36; see also Fisher, 6/2/99am, at 57:19 - 59:1 (discussing Fisher, "Microecomomics: Essays in Theory and Applications" (DX 2487)).

3.   Microsoft's dominant market share reflects monopoly power because its position in operating systems is protected by high barriers to entry

23. Microsoft's dominant market share reflects monopoly power because that share is

both the source of, and protected by, immense entry barriers that prevent rivals from entering or

expanding.

a.   Definition of barriers to entry

24. An entry barrier is any factor that permits firms already in the market to earn returns above the competitive level without inducing entry or expansion that would erode those returns.

    i.   Professor Fisher testified that a barrier to entry "permits the incumbent firms" to "earn supernormal profits without having their business bid away by the expansion of competitors or the entry of new firms." Fisher, 1/6/99am, at 52:20-23; Fisher, 6/1/99am, at 47:20-24.

    ii.   Dean Schmalensee characterized as consistent with his definition of an entry barrier "'any factor that permits firms already in the market to earn returns above the competitive level while deterring outsiders from entering.'" Schmalensee, 1/14/99am, at 6:17 - 7:19 (quoting Areeda & Hovenkamp).

b.   The applications barrier to entry protects Microsoft's dominant position in operating systems

25. The principal barrier to entry into operating systems is what has been termed in this case the applications barrier to entry.

    ii.   Professor Fisher testified that the "dominant position of Microsoft's operating system is protected by the applications programming barrier to entry." Fisher Dir. ¶ 82; Fisher, 6/1/99am, at 48:4-11.

    ii.   Dr. Warren-Boulton testified that "the applications barrier to entry sustains Microsoft's dominance, critically contributes to its monopoly power, and helps explain why other Intel-compatible operating systems, such as OS/2 and Linux, have persistently small market shares." Warren-Boulton Dir. ¶ 56.

    25.1. The applications barrier to entry results from a chicken-and-egg problem: Users will not in large numbers use an operating system other than Windows unless it supports a set of applications comparable to the set of applications available for Windows, but ISVs will tend not to write comparable applications for other operating systems in large numbers because those operating systems lack a large number of users.

        i.   Avadis Tevanian testified that Microsoft's dominant position rests in part on "a commercial symbiosis that exists between application programs and the computer operating systems on which those programs run. An

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application program is condemned to commercial failure if it will not operate reliably on the operating system of a sufficiently large installed base of computer systems. Similarly, the commercial viability of an operating system is critically dependent on the availability of application programs . . . ." Tevanian Dir. ¶ 15.

ii. Dr. Warren-Boulton testified that as "an operating system gains popularity, the incentive to develop software for the operating system increases because the larger number of users for the operating system product implies a greater potential market for software developers. The development of yet more applications for that operating system, in turn, increases the value of the operating system to end users who, as explained, purchase operating systems in significant part based upon the quality and variety of applications available for it." Warren-Boulton Dir. ¶ 53.

25.2. In other words, Microsoft's very large market share and installed base of users -- which create incentives for ISVs to write first and foremost to Windows rather than to other operating systems -- are themselves the source of an immense entry barrier that keeps the share of operating system rivals low and protects Microsoft's monopoly power.

i. Professor Fisher testified that "Microsoft's high market share leads to more applications being written for its operating system, which reinforces and increases Microsoft's market share, which in turn leads to still more applications being written for Windows than for other operating systems, and so on." Because of this pattern, Microsoft's "share is not likely to be eroded by new entry as long as the applications programming barrier to entry remains strong." Fisher Dir. ¶ 70.

ii. Dr. Warren-Boulton testified that "an operating system product can rise to dominate the market, and once that dominance is achieved maintain it, because of both the large number of complementary software applications available for it and the flow of new applications that are written to it." Warren-Boulton Dir. ¶ 54.

**(1)   Microsoft possesses a dominant market share because
software developers have powerful incentives to write
applications first and foremost to Windows**

26. The economic factors that create incentives to write applications first and foremost to

Windows, and reinforce Microsoft's dominant market share, have three aspects.

26.1. <u>First</u>, Microsoft has a dominant share of PC operating systems because a

much greater breadth, depth, and number of applications run on Windows than on other

operating systems.

26.1.1. Users demand operating systems in order to run applications; and

the greater the number, variety, and quality of applications available for a particular operating

system, the greater the demand for that operating system.

i.   In a Microsoft marketing plan entitled "Winning @ Internet
Content" dated June 22, 1996, Andrew Wright wrote, "Microsoft's
success to date as a <u>platform</u> company has primarily been driven by
the availability of compelling applications for Microsoft operating
systems. Operating systems, including Windows 95, Windows NT
etc, are a means to an end and not an end in themselves. End users
buy computers and operating systems to run applications." GX
407.

ii.   Microsoft's Chris Jones wrote in August 1995 that: "While there
are many factors which determine an OS purchase, fundamentally
consumers purchase the system that runs the cool applications first
and best." GX 523, at MS98 0103654.

iii. Avadis Tevanian testified that "the commercial viability of an
operating system is critically dependent on the availability of
application programs--including well-accepted, broadly-used
application programs--that are written for use on that system."
Tevanian Dir. ¶ 15.

iv.   Microsoft admitted in its Answer that the "popularity of an
operating system is to some extent a function of the number,

variety, and quality of applications available to use with that operating system . . . ." Answer ¶ 58.

    v.   Microsoft's pricing decisions reflect the fact that Windows is demanded precisely because of the number of applications written for Windows. Kempin testified that "competitors are producing, essentially . . . inferior-type products" because "the number of applications written for [Windows] is so huge" is an observation of the "result of the applications barrier to entry, and it's a fairly clear statement." Kempin, 2/25/99pm, 98:15-99:5 (quoting Kempin's deposition, 21:20-22:6, 22:19-24). This, Professor Fisher explained, is exactly what one would expect Kempin, a non-economist, to say rather than saying "I am protected by the applications barrier to entry and so, I have freedom as to pricing." Fisher, 6/1/99pm, at 5:15 - 6:5.

26.1.2. Applications written for one operating system generally do not run on another because each operating system has its own, unique set of application programming interfaces ("APIs") to which applications are written.

    i.   Because operating systems have different APIs, "software applications written for one operating system will not run well on any other operating system." Barksdale Dir. ¶ 71.

    ii.   <u>See</u> <u>also</u> Soyring Dir. ¶¶ 6-7 ("For an application to operate properly on an operating system, it must be designed to work" with that operating systems's APIs.); Gosling Dir. ¶ 12 (testifying that applications are largely "platform-specific"); Tevanian Dir. ¶ 12 ("Application programs must be developed so that they are compatible with the APIs of the underlying operating system. For example, Microsoft's popular word processing program, Word for Windows, will run on the Windows operating system; it cannot run on the Mac OS operating system.").

26.1.3. A vastly larger number of applications are written for Windows than the number written for other operating systems.

    i.   There are "tens of thousands" of applications that run on Windows. Martiz, 1/25/99pm, at 22:10-13; Rose, 2/17/99pm, at 24:24 - 25:9

(testifying that there are over 70,000 applications available for Windows).

ii   According to Microsoft's own economic expert, the number of applications available for other operating systems is at least an order of magnitude lower. DX 2098, at E2 (reporting that approximately 12,000 applications are available for the Macintosh, 900 for BeOs, and 250 for Linux).

26.1.4. As a result, Microsoft has a dominant share of the installed base of

operating system users and of the operating system market.

i.   Microsoft's Brad Chase explained, "Content drives systems. Windows won the desktop OS battle because it had more applications earlier than any other platforms." GX 510, at MS7 004130.

ii.   Microsoft's Ben Slivka testified that "an advantage Windows has today in the marketplace and why customers prefer Windows today over Macintosh OS or some other operating systems is that there are a large number of applications that customers need . . . that are available primarily on Windows or have their best expression on Windows." Slivka Dep., 1/13/99, at 717:22 - 718:4.

iii.   Microsoft's own witness, Compaq's John Rose, conceded that the huge number of applications available for Windows relative to other operating systems is "certainly the prime reason" why Compaq lacks a commercially viable alternative to Windows. Rose, 2/17/99pm, at 19:21 - 20:20. As Rose elaborated (Rose, 2/17/99pm, at 24:24 - 25:9):

Q: Now, is it fair to say that the absence of any other operating system that can run those 70,000 applications or any predominant chunk of them is a prime reason why you believe there is not at present commercially viable alternative to Windows?

A: Yes, that is part of it.

Q: Okay.

> A: The fact that other operating environments do not support that rich set of applications which are being utilized by hundreds of millions of personal computer users.

iv. Joachim Kempin testified that he didn't consider other operating systems in setting the royalty for either Windows 95 or Windows 98 because "'the simple fact that the number of applications, peripheral devices, support on that platform, basically, is so huge that the benefits for buying into that platform is huge'" Kempin, 2/25/99pm, at 98:18 - 99:5 (quoting Kempin's deposition). As Professor Fisher testified, Kempin's testimony reflects Microsoft's perception that it is "protected by the applications barrier to entry." Fisher, 6/1/99pm, at 5:13 - 6:5.

v. Packard-Bell's Mal Ransom testified: "There are appropriate applications, be they games or education or reference that are - that work with the operating system. That's a major factor for us in the consumer business that consumers can go buy solutions that match with our operating system. And Windows has really become a worldwide standard in that regard." Ransom Dep. (played 12/16/98pm), at 69:24 - 70:10.

vi. For additional evidence, see Von Holle Dep., 1/13/99, at 298:2-23 (testifying that Gateway lacks a commercially viable alternative to Windows because "there's not enough support in the form of applications in the marketplace to-to run on alternative operating environments"); Tevanian, 11/4/98pm, at 11:12 - 12:18 (testifying that "it's still the case that the predominant number of applications in the market do not run on the Macintosh, and because of that, most people will just refuse to buy a macintosh, they'll want safety in the applications that are on Windows").

26.2. <u>Second</u>, because of the economic incentives they confront, ISVs tend to write first and foremost to the operating system with the dominant share, which is Windows.

i. Professor Fisher testified that the principal reason "that ISVs write for Windows first," is that "there are economies of scale and it pays to write for the system that has the most users." Fisher, 6/1/99am, at 54:2-5.

26.2.1. Software development is characterized by substantial economies of scale. The fixed costs of producing software, including applications, is very high. By

contrast, marginal costs are very low. Moreover, the costs of developing software are sunk; once

expended to develop software, resources so devoted cannot be used for another purpose.

    i.   Paul Maritz testified that "software products can be produced and distributed in vast quantities very rapidly. Once a software product is created, the cost to copy is near zero, and the product can be quickly distributed around the block or around the world via the Internet or other networks." Maritz Dir. ¶ 115.

    ii.   Intuit's William Harris testified that "the economics of software development make high volume sales critical to profitability. The fixed costs of developing software -- including, among other things, research, development, programming and testing -- are very large and can only be offset by high volume sales. By contrast, the variable costs of manufacturing software once it has been developed are quite low. Thus, it is essential for profitability of most PC-based software products that the product be compatible with Windows. At Intuit, compatibility with Windows is so critical that the company will focus on such compatibility even if this requires slowing or abandoning development of software for use with other operating systems." Harris Dir. ¶ 25.

    iii.   Dr. Warren-Boulton testified that "operating systems in particular, and software in general, are characterized by economies of scale. The bulk of the costs are development costs" whereas the costs "of producing and marketing individual copies of the product ('the marginal costs') are, by comparison, quite small." Warren-Boulton Dir. ¶ 47.

26.2.2. The result of economies of scale and sunk costs is that

applications developers seek to sell the highest number of copies; for it is only through selling a

large number of copies (for which the marginal cost is low) that the large, sunk fixed costs

necessary to develop software can be recovered

    i.   Harris Dir. ¶ 25.

    ii.   Professor Fisher testified that because of the "upfront costs of writing the software" and the fact that marginal costs of distributing it are "essentially zero," ISVs will have "a big

incentive to write for the most popular operating system and write for it first because you have the possibility of lots of sales, and that means your costs per sale will be very low." Fisher, 6/1/99am, at 59:10-16.

26.2.3. This creates overwhelming incentives to write first and foremost

for Windows because writing for Windows -- the operating system with the dominant share --

gives applications developers by far the highest expected return for the sunk costs incurred.

26.2.3.1. An application that is written for one operating system,

like Windows, will operate on another operating system only if it is "ported" to that system. As

numerous witnesses testified, porting applications is both time-consuming and expensive.

> i. John Soyring testified that it took IBM "about a year and a half to port Netscape Navigator from Netscape's Windows implementation to OS/2, and that was having access to the Netscape source code and having the Netscape engineers working side by side with us in their laboratories in California." Soyring, 1/18/98pm, at 65:15 - 66:18; Soyring Dir. ¶ 7 (porting "can be both costly and time consuming.").

> ii. Jim Barksdale testified that "it is time-consuming and expensive, however, to take a piece of applications software developed for the Windows platform and port it to the OS/2 or Macintosh platform or to some other platform." Barksdale Dir. ¶ 75.

> iii. James Gosling testified that the "tedious process, which is known as 'porting' software to other platforms, dramatically increases the cost of software programs, and consumes scarce time and resources that could otherwise be devoted to developing innovative applications." Gosling Dir. ¶ 13.

26.2.3.2. As a result of these factors, ISVs tend to write

applications first and foremost for the highest volume platform, Windows.

i.   Microsoft's Steve Ballmer wrote in July 1997: "It's important for us to keep developer focus. And market share is an important part of that. If you don't have good market share, you're going to lose developer interest." GX 679, at 8.

ii.   Intuit's William Harris testified that "it is essential for profitability of most PC-based software products that the product be compatible with Windows. At Intuit, compatibility with Windows is so critical that the company will focus on such compatibility even if this requires slowing or abandoning development of software for use with other operating systems." Harris Dir. ¶ 25.

iii.   Jim Barksdale testified that, because of Microsoft's large market share, "if anybody wants to build a product, they build it there first. You don't start a company building for some niche operating system. You always start with . . . the current version of Windows . . . if you're going to be out there selling any product, you have to be on that year's product or you can't succeed in any reasonable way." Barksdale, 10/27/98am, at 70:18 - 71:9; Barksdale Dir. ¶ 73 (Barksdale explains that "ISVs looking at this world quite sensibly write most of the software for the platform with the widest use. That means that most applications are written for the Windows platform.).

iv.   Dr. Warren-Boulton testified that "market share is, . . . overwhelmingly, the critical issue in determining . . . developers' decisions." Warren-Boulton, 11/19/98am, at 86:14-16; Warren-Boulton Dir. ¶ 53 (testifying that the development of more applications for a given operating system "increases the value of the operating system to end users" who "purchase operating systems in significant part based upon the quality and variety of applications available for it." If the operating system's market share increases, "that, in turn, is likely to cause software developers to devote yet more resources to writing applications for that operating system").

v.   Ron Rasmussen, Vice-President of the Santa Cruz Operation, testified at his deposition that "all the application vendors look at market share and the

cost/benefit analysis of providing that application on any operating system. So if it costs them more than they believe they're going to get in revenue or if they believe their revenue is just a trade from one operating system to another, there's no financial benefit for producing that application on other operating systems." Rasmussen Dep., (played 12/15/98am), at 58:3-9.

26.3. <u>Third</u>, the result of the above factors is that Windows exhibits very strong network effects that reinforce demand for Windows.

26.3.1. A network-effect is a phenomenon in which the attractiveness of a product increases with the use of that product by others.

i.   Fisher Dir. ¶ 42.

26.3.2. Windows exhibits strong network effects because each user benefits from the fact that there are a multitude of other Windows users, that Windows has a dominant market share, and that ISVs therefore write first and foremost to Windows. The fact that ISVs write first and foremost to Windows, in turn, reinforces demand for Windows and thereby augments Microsoft's dominant position and perpetuates ISV incentives to write applications principally for Windows; and so on.

i.   James Gosling testified that, as a result of the incentives to write "first" and often "only" for Windows (Gosling Dir.¶ 15), "more software applications are available for Windows users, which makes that platform even more attractive for customers. This, in turn, reinforces the dominance of Windows, and leads even more developers to develop software for Windows." Gosling Dir. ¶ 18.

ii.   William Harris testified: "The development of software that is compatible with the Windows operating system itself reinforces the dominance of Windows, because consumers seek to purchase the operating system that is compatible with the greatest number of software applications. In turn, software producers want their products to be compatible with the operating system that is most

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widely used by consumers. This creates a self-reinforcing cycle (sometimes referred to as a 'network effect'), which tends to perpetuate and enhance the dominance of the leading operating system." Harris Dir. ¶ 27.

iii.   James Barksdale testified: "Because so much software is written for the Windows platform, consumers who want to take full advantage of their computers and to have the maximum number of choices of applications available continue to purchase machines with a preinstalled Windows operating system. At the same time, the more personal computers sold with Windows operating systems, the more ISVs continue to write applications for the Windows platform. In other words, the sale of computers with Windows operating systems feeds the development of software for the Windows platform, which in turn, generates additional sales of computers with Windows operating systems." Barksdale Dir. ¶ 74.

v.   Professor Fisher summarized: "Microsoft's high market share leads to more applications being written for its operating system, which reinforces and increases Microsoft's market share, which in turn leads to still more applications being written for Windows than for other operating systems, and so on." Fisher Dir. ¶ 70.

vi.   Dr. Warren-Boulton testified that the development of more applications for a given operating system "increases the value of the operating system to end users" who "purchase operating systems in significant part based upon the quality and variety of applications available for it." If the operating system's market share increases, "that, in turn, is likely to cause software developers to devote yet more resources to writing applications for that operating system." Warren-Boulton Dir. ¶ 53.

26.3.3. This self-reinforcing cycle is confirmed by the observed market facts: Windows' market share has been, and remains, much larger than rivals; most ISVs develop new applications first and in the great numbers for Windows; and the continued assurance of a large, up-to-date stock of applications for Windows ensures that users demand Windows.

i.   See supra ¶ 26.1.3.

ii.   Dr. Warren-Boulton testified that "the applications barrier to entry sustains Microsoft's dominance" and because of it "no rival has succeeded in mounting a sustained effective threat to Microsoft's market dominance." Warren-Boulton Dir. ¶ 56.

iii.   John Soyring testified that "OEMs have no commercially viable choice but to license Windows." Even though other operating systems exist, OEMs "cannot reasonably base their businesses on these alternatives, due, in large measure, to the lack of applications and device support." Soyring Dir. ¶ 11.

(2)   The same factors that reinforce Microsoft's large market share inhibit other operating systems from challenging Windows

27. Just as Microsoft's high market share creates incentives for ISVs to develop applications first and foremost to Windows, the absence of a significant installed base makes it much more expensive — indeed, prohibitively so — for other operating systems to ensure the availability of a sufficient set of applications to enable those operating systems to become good substitutes for Windows.

i.   Professor Fisher testified that when a firm gains a large market share due to network effects, "it will prove increasingly difficult for other firms to persuade customers to buy their products in the presence of a product that is widely used. The firm with a large share may then be able to charge high prices or slow down innovation without having its business bid away." Fisher Dir. ¶ 43.

ii.   Dean Schmalensee agreed with John Soyring's testimony that part of the reason for OS/2's failure was that "IBM did not have a sufficient number of applications to compete effectively with Microsoft." Schmalensee, 1/14/99am, at 34:15-25. Similarly, Dr. Warren-Boulton observed that "IBM has found with OS/2 that it is simply impossible to effectively compete with Microsoft in the home computer market because of the problem that it doesn't have enough applications." Warren-Boulton, 11/24/98am, at 53:5-8. This competition between OS/2 and Windows illustrates the operation of network effects, in which "the firm with the largest market share becomes larger and the firm with the smaller market share becomes smaller." Warren-Boulton, 11/24/98am, 52:20-21.

27.1.   First, contrary to Microsoft's contention that all it takes to create a rival to Windows is applications in a few key categories (Schmalensee, 6/22/99pm, at 60:12-20; Maritz, 1/27/99pm, at 10:2 - 11:2), to provide a viable substitute for Windows, a rival operating system would need to offer both (1) a large, diverse, and frequently updated set of applications and (2) assurances to users that such applications will be available in the future.

    i.   See supra ¶ 26.2.3.

    ii.   Although both Linux and Be OS, two relatively new Intel-based PC operating systems, support several hundred applications -- including applications in the categories users tend to use most (such as word processing, personal finance, and browsing)-- neither, as Dean Schmalensee conceded, can effectively substitute for Windows. (Schmalensee Dir. ¶ 107, 108). The reason, as Microsoft's own OEM witness, John Rose, explained, is that such "operating environments do not support that rich set of applications which are being utilized by hundreds of millions of personal computer users." Rose, 2/17/99pm, at 24:24 - 25:9.

    iii.   Avadis Tevanian testified that Apple -- despite having thousands of applications, including applications in all the "categories" users frequently employ -- cannot gain users from Microsoft because "it's still the case that the predominant number of applications in the market do not run on the Macintosh, and because of that, most people will just refuse to buy a Macintosh, they'll want safety in the applications that are on Windows." Tevanian, 11/4/98pm, at 11:12 - 12:18.

    iv.   Paul Maritz conceded that other information devices, running other operating systems, cannot "be a real competitor" unless they support "a wide range of applications." Maritz, 1/27/99pm, at 11:3-24 (quoting Maritz's deposition).

    v.   Professor Fisher testified that an "entrant would have to get written for it -- and show that there was an assurance that this would continue -- applications of the general number and breath for Windows, and I would suppose that for the more popular applications, the entrant would probably need the same ones." Fisher, 1/13/99am, 5:9-14; Fisher, 6/1/99am, at 56:2-9 (similar).

27.2. <u>Second</u>, Microsoft's large installed base makes it prohibitively expensive for rival operating systems to acquire the large set of applications necessary to compete effectively with Windows.

27.2.1. The sunk costs required for an operating system vendor itself to create the necessary applications itself are prohibitively large.

i. Dean Schmalensee conceded that no operating system vendor will develop the necessary applications on its own. Schmalensee, 1/14/99am, at 15:23 - 16:9.

ii. Professor Fisher testified that an entrant faced with incurring significant sunk costs for an uncertain return "isn't going to go in" because "it's going to have to battle the incumbent and because it will have to give up these hostages to fortune." Fisher, 6/1/99am, at 50:18-25.

iii. Dr. Warren-Boulton testified that "competition between two suppliers, each with very high fixed costs and very low marginal costs, would likely result in a decrease in prices, further reducing the profitability of entry to the would-be entrant. Entry into head-to-head operating system competition with Microsoft thus would be time consuming, risky, and costly; profiting from such entry would be at best very uncertain and long in coming." Warren-Boulton Dir. ¶ 48.

27.2.2. Accordingly, in order to ensure the availability of a set of applications comparable to that available for Windows, a potential rival would need to induce a large number of ISVs to write to its operating system.

i. Dean Schmalensee testified that the question is whether "the ISV community, can be convinced to provide applications programming for an alternative operating system." Schmalensee, 1/14/99am, at 15:23 - 16:9.

ii. Dr. Warren-Boulton testified that to "offer a product that a significant number of consumers wish to have installed on their PCs," vendors of alternative "operating systems would have to

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create, or induce others to create, an extensive set of compatible software applications. This would be not merely expensive, but also very risky." Warren-Boulton Dir. ¶ 57.

27.2.3. The cost to an entrant of inducing ISVs to write applications for their operating system exceeds the cost faced by Microsoft when it induced ISVs to write applications for the DOS and/or Windows operating system because Microsoft did not face a highly penetrated market dominated by a single competitor.

      i.   Professor Fisher testified: "After Microsoft's victory, the cost of pursuading ISV's to build such a stock rather than write for Windows has got to be much more substantial than it was for Microsoft to persuade them in the first place." Fisher, 6/1/99am, at 53:22 - 54:1.

27.2.3.1. In deciding whether to write for a particular operating system, an ISV will consider the return it expects from incurring sunk costs, and that depends on the number of users it expects the operating system will have.

      i.   Dr. Warren-Boulton testified that it is not the return if the firm succeeds that governs investment decisions, but rather expected return, including the risk if the venture fails. Warren-Boulton, 11/19/98pm, at 52:11 - 53:7, 70:2 - 71:10.

      ii.   Dean Schmalensee testified that "ISVs will not write applications software for an operating system unless they expect enough consumers to use that operating system." Schmalensee Dir. ¶ 100; Schmalensee, 6/23/99pm, at 59:10-22 (same).

27.2.3.2. ISVs will not in large numbers expect that a niche (or new) operating system will succeed in competing against Windows because ISVs face a "collective action problem": a rival operating system cannot succeed without a large number of applications, but no individual ISV can be assured that a sufficient number of ISVs will write all

the applications necessary for rival operating systems to succeed. As a result, each individual

ISV will continue to write first and foremost for Windows because that is what it will expect its

rivals to do; and other operating systems will therefore be unable to gain appreciable share from

Windows.

i.   Professor Fisher testified that for a new operating system vendor to be successful, it "takes an awful lot of people" writing applications. But in assembling this critical mass, there "is a collective action problem. That is, in deciding to write for a new system, each ISV will not take into account the fact that his action" will have "some influence on the success of the new operating system."   Fisher, 6/1/99am, at 58:10-18.

ii.   Tevanian testified, regarding Apple's inability to persuade developers to write for the proposed Rhapsody operating system: "Developers, including Microsoft, told Apple that they were concerned that Apple would not be able to obtain a critical mass of application programs written to work with the new Rhapsody APIs and that customers, accordingly, would not buy computers containing the new operating system." Tevanian Dir. ¶ 19.

iii.   Dr. Warren-Boulton summarized developer incentives: "If you think of it as a trojan horse, any individual applications writer looks at the market for operating systems, and he says, 'I'm writing to the PC platform. 90, 95 percent of the people who are likely to use my application are using Windows; and therefore, it's worth it for me individually to make a decision to use J/Direct.' On the other hand, if you look at the interests of applications writers as a whole, if they all do that, nobody will write in cross-platform applications. So, it is a quandary. What is in the interests of individual application writers to do may not be in the interests of applications writers as a group." Warren-Boulton, 11/23/98pm, at 40:2-13.

iv.   Microsoft's Steve Ballmer wrote in July 1997: "It's important for us to keep developer focus. And market share is an important part of that. If you don't have good

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market share, you're going to lose developer interest." GX 679, at 8.

iii. William Harris explained that, because of Microsoft's dominant market share, Intuit had "abandoned development of Macintosh-compatible versions of QuickBooks and has dramatically reduced development of Macintosh-compatible versions of Quicken and TurboTax." Harris Dir. ¶¶ 25-26.

27.2.3.3. A rival operating system vendor cannot effectively solve

this problem by paying the necessary number of ISVs to write for its operating system because

the sunk costs of doing so are massive relative to the expected return.

i. Professor Fisher testified that one "might pay ISVs to write to your operating system. That in itself is part of the barrier to entry, that you have to pay them to turn away from Windows." Fisher, 6/1/99am, at 55:23 - 56:1. He further testified that doing so in order to challenge Windows was infeasible because of the very collective action problem that prevents ISVs from doing so on their own. He explained: "There is a collective action problem. That is, in deciding to write for a new system, each ISV will not take into account the fact that his action will have something to do with the success of . . .some influence on the success of the new operating system, because he won't reap all the rewards from that. It takes an awful lot of people doing this to make it a go." Fisher, 6/1/99am, at 59:2-18.

ii. John Soyring testified that "Microsoft's enormous installed base, along with the wealth of applications and hardware device support for Windows, noted above, makes it difficult for IBM or any other company to successfully offer a new operating system for desktop and mobile PCs. Any company that attempted to do so would have to spend an enormous amount of money and time on development, marketing, and support." He further observed that this "task would be easier if there were some reasonable way to ensure that all the applications now on Windows would run on the new product. Unfortunately, there is not." Soyring Dir. ¶ 13.

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iii. MCI's David Limp testified that "it would be hard to get into the PC space" because: "There's a lot of home-grown application development, which has been written directly to Windows and Win--not to the languages of the Web but Windows languages, that unseating that is--you know, I tried it for eight years of my life at Apple. It's just a very hard problem, and it takes a lot of resources, and nobody has been successful, so, I mean, just putting on your business hat, you kind of veer to the easier problem, right? And that's a hard problem. IBM couldn't do it. Sun is having a tough time. Apple basically couldn't do it, so it's an uphill battle and, and we chose to fight our competition in an area that was more wide open that we could define ourselves, that was--that we could redefine the playing field." Limp Dep., 7/30/98, at 143:6-25 (DX 2576).

iv. James Gosling testified that "it's very difficult for a developer to financially justify developing software for a platform like Solaris which has very low volume. The differential between Solaris and Windows is something like a hundred to one, which would mean the financial return would be about a hundred to one different, and yet the engineering effort is about the same." Gosling, 12/10/98pm, at 26:16 - 27:3.

(3)   The persistence of Microsoft's huge market share is itself evidence of high entry barriers

28. That Microsoft's monopoly is protected by high entry barriers is reflected in the fact that, for the last several years, Microsoft has possessed a dominant share of the market and other operating systems have gained no more than a trivial share of the market.

i. Dr. Warren-Boulton testified that "the applications barrier to entry sustains Microsoft's dominance, critically contributes to its monopoly power, and helps explain why other Intel-compatible operating systems, such as OS/2 and Linux, have persistently small market shares." Warren-Boulton Dir. ¶ 56.

(4) **The testimony of Apple and IBM illustrates the strength of the applications barrier to entry**

29. The experience of Microsoft's most significant operating system rivals in the middle and late 1990s, IBM and Apple, confirms the strength of the applications barrier to entry.

30. IBM's inability to gain widespread developer support for its OS/2 Warp operating system illustrates how the massive Windows installed base makes it prohibitively costly for a rival operating systems to attract applications sufficient to substitute for Windows.

30.1. IBM in 1994 introduced its Intel-based OS/2 Warp operating system, targeted at the consumer market, and spent tens of millions of dollars in an effort to attract ISVs and in an unsuccessful attempt to clone part of the Windows API set.

    i. Soyring testified that IBM "spent tens of millions of dollars working with ISV's around the world . . . to try to convince them to develop" for OS/2. Soyring, 11/18/98pm, at 58:20 - 60:1, 66:19 - 67:8.

    ii. Soyring further testified that IBM devoted substantial resources in an ultimately unsuccessful attempt to clone part of the Windows API set. Soyring, 11/18/98pm, at 61:15 - 62:1.

30.2. Despite these efforts, IBM could obtain neither significant market share nor ISV support for OS/2 Warp.

    i. Soyring testified that, even when "it would have made economic sense for an ISV to port their application to OS/2, many times they felt those programmers could be better spent building new functions or new applications for Windows because it provided a potential for greater economic return for them" and because "of the larger number of . . . Windows application users." Soyring, 11/18/98pm, at 67:11-24.

    ii. As Soyring summarized, IBM found that it was caught "in a vicious cycle. First, the limited number and type of OS/2 applications has resulted in a limited demand for OS/2. That, in turn, has meant that relatively few PCs are shipped with OS/2, and that the installed base of OS/2 is relatively small. This relatively small installed base of OS/2 installations has further

reduced the incentive for application developers to spend the resources necessary to port their existing applications to OS/2 and to then offer and support them on OS/2." Soyring Dir. ¶ 9.

iii.   OEMs -- including IBM's PC business -- will not preinstall OS/2, and the reason is the absence of applications. Romano Dep. (played 12/16/98pm), at 33:4-19 (Hewlett Packard has "not seriously" considered installing OS/2); Ransom Dep. (played 12/16/98pm), at 70:11 - 71:8 (OS/2 was "trying to make a push at the consumer market. And the big problem with it is we needed OS/2 plus Windows because OS/2 did not have the compatibility. OS/2 was an operating system and worked fine on the systems, but you needed Windows for the compatibility of all the applicants. So it didn't make any sense resource-wise -- and by resource, I don't mean just double charging, but the resources of the machine to have two operating systems on it."); Romano Dep. (played 12/16/98pm), at 72:5-23 (because of the lack of applications compatible with OS/2, it was not a viable choice for Packard Bell.).

30.3.   Thus, although at its peak OS/2 ran approximately 2,500 applications and had 10% of the market, IBM determined that the applications barrier to entry was too severe to compete against Windows in the consumer segment of the market and, for that reason, in 1996 stopped trying to convince ISVs to write to OS/2.

i.   Soyring Dir. ¶ 5; Soyring, 11/18/98pm, at 61:2-4.

ii.   Soyring testified that IBM determined that it "would not be able to compete" against Windows because the "application barrier was just too high for us to be able to compete" by promoting "OS/2 Warp 3 to consumer users." Soyring, 11/18/98pm, at 99:22 - 100:5. Thus, he explained, in 1996 IBM stopped trying to induce developers to write for OS/2's APIs altogether because of it's inability to compete against Windows. Soyring, 11/18/98pm, at 93:19-21.

iii.   Dean Schmalensee agreed with Soyring's testimony that part of the reason for OS/2's failure was that "IBM did not have a sufficient number of applications to compete effectively with Microsoft." Schmalensee, 1/14/99am, at 34:15-25.

iv.   Dr. Warren-Boulton testified that "IBM has found with OS/2 that it is simply impossible to effectively compete with Microsoft in the home

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computer market because of the problem that it doesn't have enough applications." Warren-Boulton, 11/24/98am, at 53:5-8. This competition between OS/2 and Windows illustrates the operation of network effects, in which "the firm with the largest market share becomes larger and the firm with the smaller market share becomes smaller." Warren-Boulton, 11/24/98am, at 52:20-21.

30.4. Microsoft's contention that OS/2's failure was a consequence of IBM's own mistakes is misplaced because it confuses the reasons for the failure of early versions of OS/2 with the reason -- the applications barrier to entry -- that OS/2 Warp cannot gain substantial market share today.

        i.   As Soyring testified, IBM rectified many of OS/2's problems by the time of OS/2 Warp's release. Soyring explained that "the reductions in size that we made in the operating system program were such that it made it very competitive in terms of the amount of memory that was required, so it turned out to be quite suitable, and we had a fair amount of success initially selling the products at least to a particular subset of the home users." Soyring 11/18/98pm, at 58:25 - 59:7.

        ii.   Microsoft suggested that OS/2 Warp failed because IBM didn't spend enough to attract developers. Soyring, 11/18/98pm, at 92:20 - 93:1. This, however, is entirely consistent with the applications barrier to entry. As Soyring testified, because of Microsoft's installed base, the cost to IBM of attracting significant developer interest was prohibitive. Soyring Dir. ¶ 13.

31. The inability of Apple effectively to compete with Windows also evidences the operation of the applications barrier to entry.

31.1. Although Apple's Macintosh operating system supports more than 12,000 applications, that stock of applications is not sufficient to enable Apple to substitute for Windows for a large number of users.

        i.   Avadis Tevanian testified that "the predominant number of applications in the market do not run on the Macintosh, and because of that, most people will just refuse to buy a Macintosh. They'll want safety in the applications that are on Windows. Or in some cases they'll be required to run

Windows. For example, in almost every corporation in the world, they have to run some specific applications that are only on Windows." Accordingly, despite the fact that the iMac is selling well, "in the grand scheme of things, there is still the Windows monopoly, that it's a situation where people need to run Windows applications, and they buy Windows computers." Tevanian, 11/4/98pm, at 11:21 - 12:13.

ii. Dr. Warren-Boulton testified that there are approximately 12,000 applications available for users of the Macintosh operating system, but that Apple cannot constrain Microsoft's ability to exercise market power. Warren-Boulton, 11/23/99pm, at 16:7-13.

31.2. The absence of a large installed base, in turn, reinforces the disparity between the applications available for the Macintosh operating system and those available for Windows, further inhibiting Apple sales.

i. Microsoft's Paul Maritz conceded that "fewer software developers create products for the Apple Macintosh because there are fewer Apple Macintosh customers to buy such products." Maritz Dir. ¶ 179.

ii. Apple's Avadis Tevanian testified that an "application program is condemned to commercial failure if it will not operate reliably on the operating system of a sufficiently large installed base of computer systems. Similarly, the commercial viability of an operating system is critically dependent on the availability of application programs--including well-accepted, broadly-used application programs--that are written for use on that system." Tevanian Dir. ¶ 15. Consequently, "Apple has learned through experience" that "the symbiosis between operating system[s] and application programs creates significant barriers to the introduction and growth of competing operating systems." Id. at ¶ 16.

31.3. Also illustrative is Apple's inability to gain developer support for its Rhapsody operating system in 1997.

31.3.1. Rhapsody offered users new, attractive technologies; but taking advantage of these technologies would have required ISVs substantially to rewrite their

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applications, a process requiring a substantial investment and, therefore, a significant volume of

sales to recoup.

      i.   Avie Tevanian testified that "the biggest reason" ISVs would not write Rhapsody applications was that "they needed to have an economic incentive, they needed to know that they could sell a lot of copies of their applications; and to sell a lot of copies of their applications, they needed to know that there were going to be lots of copies of the operating system, and they just didn't believe that Apple had any chance of selling a lot of copies of this operating system." Tevanian, 11/4/98pm, at 44:5-13.

31.3.2. Developers refused to make this investment because they did not

believe that Apple could gain significant volume against Windows to make the additional sunk

costs worthwhile.

      i.   Tevanian testified that developers "didn't see that Apple would ever get sufficient volume on Rhaspody so that they thought they would have an economic return on their investment." Tevanian, 11/4/98pm, at 83:20-23.

      ii.   Tevanian explained that the Windows installed base was the reason why developers thought Apple "had no chance of achieving any significant volume with a new operating system." Tevanian, 11/4/98pm, at 85:19-23.

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31.3.3. Other reasons may have contributed to Rhapsody's failure --

Apple's financial difficulties and Microsoft's refusal to support its ability to work with Windows

NT -- do not detract from the illustration Rhapsody provides of the applications barrier to entry.

      i.   The very document Microsoft introduced in support of its assertion that Apple's financial distress hurt Rhapsody shows, in fact, developer concern as to whether Apple could gain sufficient share to make their investment worthwhile. DX 1769 ("For Developers, the ramp for Rhapsody is not irrelevant."); see also Tevanian, 11/4/98pm, at 96:23 - 99:23.

ii.   The force of the applications barrier to entry is demonstrated by the steps Apple took following Rhapsody's initial failure. Apple incorporated some of the Rhapsody technology into its new Macintosh operating system in a way that did not require ISVs significantly to rewrite their applications. As Tevanian testified, this greatly reduced the costs to developers of supporting Rhapsody because: "The economic model for them is very simple. They just keep their existing investment." Tevanian, 11/4/98pm, at 91:13-21. In short, ISVs are willing to develop for Apple when they can recoup their past investments. But because of the Windows installed base, they are generally unwilling to make substantial investments required "to go into new areas." Tevanian, 11/4/98pm, at 83:2-7.

c.   **Other entry barriers reinforce the applications barrier to entry**

32. Although the applications barrier to entry is an important factor that prevents other operating systems from developing into reasonable substitutes for Windows, other factors also inhibit the ability of other operating systems to enter or expand.

32.1. <u>Switching costs</u>. Switching to a new operating system requires users of existing systems to scrap existing investments in applications, training, and certain hardware.

i.   Dr. Warren-Boulton testified that computer users "are reluctant to switch from Windows to another operating system, even another PC operating system, because to do so requires them to replace application software, to convert files, and to learn how to operate the new software. Often, switching also means replacing or modifying hardware. Businesses can face even greater switching costs, as they must integrate PCs using the new operating systems and application software within their PC networks and train their employees to use the new software." Warren-Boulton Dir. ¶ 49; <u>id.</u> ¶ 36.

ii.   James Gosling testified that a Windows user switching to the Apple iMac would "have to buy every piece of software all over again." Gosling, 12/10/98pm, at 19:15 - 20:1.

32.2. <u>Other network effects</u>. In addition to augmenting ISVs' incentives to write for Windows, Microsoft's high market share increases the value of Windows in other ways.

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These include, among other things, common file formats and low training costs because of user

familiarity.

i. Professor Fisher testified that the ubiquity of Windows "may enable firms to avoid training costs when personnel are moved within the firm or new personnel are hired from outside. This gives firms an incentive to have the same user interface throughout its own computers and the same interface that is widely used by other firms. Other network effects include the ease of exchanging files and the opportunity to learn from others." Fisher Dir. ¶ 67.

ii. Dr. Warren-Boulton testified that switchers to another platform would "need to expend time and money learning how to use a computer designed for a different processor. And both switchers and new users would have to bear costs resulting from any incompatibility or impaired compatibility between their computer and PCs used by colleagues or others with whom the users may wish to communicate or share files." Warren-Boulton Dir. ¶ 17.

iii. Dr. Warren-Boulton also testified that the applications barrier to entry "is supplemented by other barriers to entry that derive from network effects. Books, publications, training, user groups, and news groups for the incumbent operating system product provide a large sense of community for its users. Users can exchange files, and perhaps more readily use their computers to communicate, with other members of the group. Finally, when the incumbent operating system is installed at work, it leads users to select the same operating system product for use at home." Warren-Boulton Dir. ¶ 55.

iv. "It's important for them to be able to leverage one web browser class -- for example, a training session -- among all the various users of that browser, so that, to the extent it's possible, you want the features of that browser to look and feel and act and work the same, regardless of whether the employee is running a Unix work station or an Intel-based PC." Weadock, 11/17/98am, 19:25 - 20:6 (discussing GX 217, at MS98 0109146) (corporations "want a common platform for web apps, basic end user feature similarity, simship, and it is the number one reason corps and ISPs wait or don't go with IE as std. browser")

32.3. <u>Sunk costs of developing an operating system</u>. Like other software,

developing an operating system requires incurring significant sunk costs (although actual

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production costs are low), and the significant sunk costs that must be incurred to develop an

operating system deter entry.

> i. Dr. Warren-Boulton testified: "If you build an operating system and you fail, you can't take the OS and do much else with it. That money is gone. And that makes it into a very risky business. And economists generally recognize that the higher the share of costs that are sunk, the greater the barrier to entry into that business, which really makes good sense." Warren-Boulton, 12/1/98am, at 31:2 - 31:8.

C. **Microsoft's ability to control the price of Windows evidences its monopoly power**

33. Microsoft's monopoly power is also evidenced by its ability to control the price of its operating systems.

    i.   Professor Fisher testified that a firm's "substantial ability to vary, and, indeed, to raise" price "without fearing that its customers will turn elsewhere" can be evidence monopoly power. Fisher, 6/1/99am, at 11:14 - 12:17.

1. **Microsoft does not consider rival operating systems in pricing Windows 95 or Windows 98**

34. Microsoft does not consider competitors in setting the price for Windows 98, and Microsoft does not fear that increasing the price of Windows will cause its customers to turn elsewhere.

    i.   See supra Part II.A; ¶ 15.1.5.

2. **Microsoft raised the prices of obsolete versions of Windows**

35. Microsoft's substantial pricing discretion is also demonstrated by its ability to increase the royalty for older versions of Windows, versions that Microsoft characterized as "obsolete," following the release of new versions.

    a.   **Microsoft increased the Windows 95 price when it released Windows 98**

36. Following the release of Windows 98, Microsoft,   increased the price of Windows 95 to the same level as Windows 98.

    i.   Professor Fisher testified that

               Fisher, 1/12/99pm, at 47:2-9 (sealed session).

ii.   Dean Schmalensee acknowledged that Microsoft

Schmalensee, 1/25/99am, at 51:25 - 52:12 (sealed session); Schmalensee, 1/25/99am, at 44:22 - 45:9

(sealed session).

iii.   Current OEM licenses list royalties for

See e.g., GX 461 at MS98 0009500 (IBM license) (sealed); GX 1190 at MS98 0008922 (Compaq license) (sealed).   See also Schmalensee, 1/25/99am, 51:25 - 52:7

(sealed session).

iv.   The average actual price of a Windows 95 standard license

GX 1404 (chart of prices sponsored by Professor Fisher) (sealed); DX 2330 (chart of license dates sponsored by Dean Schmalensee) (admitted in sealed session).

36.1. Microsoft's increase of the Windows 95 royalty to the same level as the

Windows 98 royalty is not consistent with a competitive market.

i.   Microsoft witnesses repeatedly asserted that

Schmalensee, 1/25/99am, at 15:6-18

(sealed session); Rose, 2/17/99pm, at 26:14

; id. at 30:9-31:11 (same) (sealed session).

ii.

Fisher, 1/12/99pm, at 45:16-22 (sealed session).

Fisher, 1/12/99pm, at 46:21-22 (sealed session). If operating

systems "were a competitive market, and Microsoft didn't have some power over price, then when the better product came out, you would expect to see the price of the older product at least stay the same and, quite possibly, go down, but it didn't. It went up." Fisher, 1/11/99pm, at 43:9-13.

36.1.1. Dean Schmalensee's testimony that

(Schmalensee, 1/25/99am, at 27:9-11 (sealed session)) is wrong,

and he ultimately acknowledged that he did not investigate whether

i.   Professor Fisher presented a chart showing that

GX 1404 (sealed); Fisher, 1/11/99am, at 19:18-22 (sealed session). These figures included

Fisher, 1/12/99pm, at 46:16-25 (sealed session)

ii.   Dean Schmalensee presented no evidence comparing

Indeed he conceded

Schmalensee, 1/25/99am, at 49:21 - 51:24 (sealed session).

iii.   Instead, Dean Schmalensee presented a chart showing

Schmalensee, 1/25/99am, at 31:18 - 32:7 (sealed session); DX 2332 (admitted in sealed session).

iv.   Dean Schmalensee also asserted that "Microsoft did not in fact increase prices for <u>Windows 95/98</u> after December 1997." Schmalensee Dir. ¶ 164. But he himself introduced a chart showing
DX 2330 (sealed).

; <u>e.g.</u>, GX 1190, at MS98 000892, MS98 0008930 (sealed); <u>compare</u> GX 449, at MSV 0002629 (1995 (sealed). Dean Schmalensee appeared to ground his erroneous assertion on the fact that (Schmalensee, 1/25/99am, at 50:3-9) (sealed session); Dean Schmalensee conceded he did not investigate whether <u>Id.</u> at 54:21 - 55:4.

b.   Microsoft used the threat of withholding discounts on Windows 95 to double the price charged IBM for Windows 3.1 following the release of Windows 95

37.   Similarly evidencing substantial and durable market power over operating systems for Intel-compatible personal computers is Microsoft's threat to withhold substantial discounts for Windows 95 in order to force IBM to accept a doubling of its royalty for Windows 3.11.

37.1. Microsoft put IBM to the choice of abandoning its favorable royalty for Windows 3.11 or sacrificing commercially crucial MDA discounts for Windows 95.

i.   Garry Norris testified that IBM, in part because of its assistance in developing the product, enjoyed a $9 royalty for Windows 3.11. Norris, 6/7/99pm, at 8:18-23, 12:8-18; 6/8/99am, at 81:23 - 82:19; GX 2194, at 90353. IBM's contract with Microsoft guaranteed IBM that rate until September 1997. Norris, 6/7/99pm, at 8:18-23.

ii.   In April 1996, Norris testified, Microsoft proposed to IBM what Microsoft termed its "Windows desktop family agreement." Norris, 6/7/99pm, at 14:13 - 15:4. The proposed agreement consisted of a single contract covering a number of Microsoft operating system products, including Windows 95, Windows 3.11, and Windows NT. Through this agreement, Microsoft conditioned substantial discounts to Windows 95, and a license to Microsoft's newest version of Windows NT, on IBM abandoning its favorable rate for Windows 3.11 and accepting a much higher rate (initially proposed at $62). Norris, 6/7/99pm, at 8:13 - 9:16, 13:16 - 14:4. IBM could sign a Windows 95 license without giving up its favorable Windows 3.11 rate, but if it did, Microsoft would withhold MDA

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discounts on Windows 95 amounting to $75 million a year. Norris, 6/7/99pm, at 9:4-9, 10:21-25.

37.1.1. Microsoft sought to raise IBM's Windows 3.11 royalty, and thereby to

migrate its installed base to Windows 95, in order to ensure Microsoft's continued market

dominance.

      i.   Norris testified that Microsoft told IBM that it conditioned discounts vital to the IBM PC Company's business on IBM abandoning its favorable rate for Windows 3.11 because Microsoft "wanted more customers to move to Windows 95, and more customers to move to Windows NT." Norris, 6/7/99pm, at 12:1-7, 39:20 - 40:2.

      ii.   As Dr. Warren-Boulton testified, one way Microsoft reinforces the applications barrier to entry is to "migrate" its "installed base" of users — those already using Windows operating systems — to newer versions of its operating system. Increasing the number of Windows 95 users increases the incentives of ISVs to develop for Windows 95, thus reinforcing the applications barrier to entry. Warren-Boulton, 11/23/98pm, at 75:13 - 77:7.

37.1.2. Microsoft also told IBM that, even if it signed the agreement Microsoft

proposed, it would not get as good a deal as IBM's rival, Compaq, because IBM (unlike

Compaq) competed against Microsoft.

      i.   See infra Part V.C.2.b(3); ¶ 209.2.1.

37.1.3. IBM ultimately acquiesced in Microsoft's demands and gave up its $9

royalty for Windows 3.11 because it lacked any viable commercial alternative to Windows 95

and the discounts Microsoft threatened to withhold were necessary in order for IBM to compete

against OEM rivals.

      i.   Norris testified that IBM gave in to Microsoft's demands because IBM "did not have a choice. We had no place else to go. We had to have Windows 95 in order to be in the PC business," and Microsoft was

threatening to increase IBM's costs "by $75 million" a year. Norris, 6/7/99pm, at 13:9-25, 40:3-15 (same).

        ii.   Norris further testified that a Microsoft account manager told IBM that accepting these terms was the "Cost of doing business with Microsoft." GX 2186; Norris, 6/7/99pm, at 74:20 - 75:10.

37.1.4. Although IBM was able to negotiate the originally offered $62 royalty Microsoft proposed for Windows 3.11 down to an effective royalty of approximately $19.50, Microsoft's threatened withholding of $75 million in MDA discounts, and its ability to increase the price charged IBM for its inferior Windows 3.11, demonstrate substantial market power.

37.1.4.1. IBM's assent to Microsoft's demands demonstrates that Microsoft possesses substantial pricing discretion with respect to Windows 95. Microsoft threatened to withhold $75 million in discounts to IBM without concern that IBM would shift its business to another operating system vendor or that charging a high price to IBM would hasten the day when a viable alternative to Windows would arise.

        i.   Professor Fisher testified that Microsoft's monopoly power is evidenced by the fact that its "customers do not believe that they have serious commercial alternatives to Windows." Fisher, 6/1/99am, at 11:9-19.

37.1.4.2. The price IBM paid for Windows 3.11 would have increased even more had IBM not kept its shipments of Windows 3.11 below 8% of all Microsoft operating systems that it shipped. Microsoft's ability to change the Windows 3.11 royalty depending on the extent to which IBM facilitated Microsoft's objective of moving users to Windows 95 is further evidence of monopoly power.

        i.   GX 2186 (document discussing IBM's royalty payments to Microsoft states as "Special Condition one" that "If win 3.11 vol.

<8% of total volume for the contract period IBM receives rebate of $5m + $6 per copy of all win 3.11 shipments").

ii.   Garry Norris testified that there was a two-part agreement under which "Microsoft offered IBM an incentive, and the incentive was that if IBM's shipments of Windows 3.11 fell below eight percent of its total Microsoft operating shipments, Microsoft would rebate to IBM 5 million U.S. dollars, which had been agreed upon in a previous settlement agreement in 1995. The second aspect of that was that after shipments did, in fact, fall below eight percent, then the price for Windows 3.11 would receive an additional $6 rebate." Norris, 6/7/99pm, at 37:10-20; see also Norris, 6/9/99pm, at 48:9 - 49:5 (same).

3.   Other aspects of Microsoft's pricing of Windows are consistent with monopoly power

38. Other aspects of Microsoft's pricing of Windows are consistent with Microsoft's

possession of monopoly power.

38.1. <u>The increasing price of Windows</u>.   In contrast to other components of a

personal computer (where prices have substantially decreased), the price of Windows has

increased in both absolute and relative terms in the past several years.

38.1.1. The price OEMs pay for Microsoft's operating systems has risen

in absolute terms in the past several years.

i.   Professor Fisher testified that he has "looked at what's happened to Microsoft's operating system price over time, and it isn't falling, and I don't believe it's falling even on a quality corrected basis. And for that matter, it isn't even constant. It's rising." Fisher, 1/11/99pm, at 41:24 - 42:3; see also GX 1404 (sealed) (chart sponsored by Professor Fisher showing

ii.   The royalty

Rose, 2/17/99pm, at 30:9-18 (sealed session).

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iii.

           GX 1430
(sealed).

iv.

           <u>See</u> <u>supra</u> Part
II.C.2.a; ¶ 32.

v.   Kempin acknowledged that

           Kempin, 2/25/99pm, 126:5 -
128:13 (sealed session); GX 1506 (sealed); GX 1508 (sealed).

    38.1.2. The price OEMs pay for Microsoft's operating systems has risen

in relative terms in the past several years.

        i.   Kempin wrote to Gates in December 1997 that the price of
                Microsoft's operating systems to OEMs has increased "over the
                last ten years" while "other components" of PC systems "have
                come down and continue[] to come down." GX 365, at MS7
                007194.

        ii.   <u>See</u> Romano Dep. (played 12/16/98pm), at 33:20 - 34:21
                (testifying that the prices of all components of the PC have
                decreased except the operating system, the price of which has
                increased); Warren-Boulton, 12/1/98am, at 26:16 - 30:9; GX 439
                (Microsoft chart demonstrating price increase); GX 1430 (chart
                based on GX 439) (sealed); Warren-Boulton Dir. ¶ 61.

        iii.   <u>Compare</u> Schmalensee, 6/23/99am, at 14:15 (testifying that
                "hardware costs are falling") <u>with</u> DX 2301 (admitted in sealed
                session) (chart sponsored by Dean Schmalensee showing

38.1.3. Although Dean Schmalensee asserted that

(Schmalensee, 1/25/99am, at

11:11 - 15:18) (sealed session), that assertion is not supported by the evidence:

> i. Microsoft, as explained, raised the price of Windows 95 to the same level as Windows 98. But Microsoft did not at the same time increase the quality of Windows 95. See supra Part II.C.2.a; ¶ 36.1.

> ii. As Professor Fisher testified, this relative increase in the price of Windows "ought to at least make one suspicious" of Microsoft's assertion that its price increases merely reflects adjustments for increased product quality. Fisher, 1/11/99pm, at 43:14-23; Fisher, 1/13/99am, at 39:13 - 41:9.

> iii. See supra ¶ 38.1.2 (price of operating system has increased relative to other components of PC system).

38.2. Microsoft's pricing of its Windows 98 upgrade. Microsoft's pricing of its

Windows 98 upgrade also is consistent with Microsoft's possession of monopoly power.

38.2.1. The evidence shows that Microsoft had substantial discretion in

setting the price of its Windows 98 upgrade product, the operating system product it sells to

existing users of Windows 95.

> i. A contemporaneous Microsoft study shows that it could have charged $49 for the product -- and there is no reason to believe that price would have been unprofitable -- but concluded it could earn greater profits by charging $89. Warren-Boulton, 12/1/98am, at 24:8 - 25:13; GX 1371, at MS7 003730, MS7 003748.

> ii. The existence of a range of prices over which Microsoft believed it could profitably sell its upgrade product is, at a minimum, consistent with its possession of substantial market power. Warren-Boulton, 12/1/98am, at 24:8 - 25:13.

38.3. <u>Microsoft's ability to price discriminate</u>. Microsoft's sustained ability to

price discriminate is probative of market power and, therefore, consistent with monopoly power.

38.3.1. Price discrimination is probative of the existence of market power

and, therefore, is consistent with monopoly power.

i.   Price discrimination is the practice of setting different prices for the same product to different customers. Schmalensee, 1/21/99am, 30:11-16. Dean Schmalensee testified that he continues to agree with his statement in his 1982 article from the Harvard Law Review, that it is "a standard textbook proposition that for a seller to practice price discrimination profitably, it must have some control over price, some monopoly power." GX 1514. By "some monopoly power" in that quotation, Dean Schmalensee says he meant "market power." Schmalensee, at 1/14/99pm, 47:7-14; <u>see also</u> Schmalensee, at 1/21/99pm, 4:22 - 5:4.

ii.   Professor Fisher testified that Microsoft's ability to price discriminate indicates its ability to earn supranormal profits from OEMs which do not pay the low price. Fisher, 1/11/99pm, 41:17 - 23. Because monopoly power is a "high and sustained degree of market power," Professor Fisher testified, evidence that Microsoft has market power helps form the basis for his opinion that Microsoft has monopoly power. Fisher, 1/13/99am, at 26:16-22.

iii.   Microsoft introduced an excerpt from a current economics textbook, which states that for a firm to be able to engage in price discrimination, the firm must have some market power. The book further comments: "Even though all firms would like to price discriminate, many are not able to do so." DX 2271, at page 434.

38.3.2. Microsoft engages in price discrimination by charging different

OEMs different prices for Windows.

i.   Professor Fisher testified that

Fisher, 1/11/99am, at 18:14 - 19:8 (sealed session).

ii.   Summarizing the charts he sponsored, Professor Fisher testified
        that the price differences among OEMs cannot be explained except
        in light of Microsoft's exercise of market power. Fisher,
        1/13/99am, 57:16 - 58:9.

iii.   As Professor Fisher's charts show,

        For instance, GX 1403 (sealed), GX1432 (sealed), and GX 1433
        (sealed) show

               GX 1405 (sealed), GX 1406 (sealed), GX 1407 (sealed)

               GX 1416 (sealed), GX 1417 (sealed), GX 1419 (sealed),
        and GX 1420 (sealed) show
                       GX 1408 (sealed), GX 1409 (sealed),
        GX 1410 (sealed), GX 1412 (sealed), GX 1414 (sealed), and GX
        1415 (sealed) show

                       GX 1422 (sealed), GX 1423 (sealed),
        GX 1426 (sealed), and GX 1428 (sealed) show

iv.   Professor Fisher testified, referring to his charts

                                       Fisher, 1/11/99am,
        at 20:12-18 (sealed session).

v.   Further, Professor Fisher testified, Microsoft's price discrimination
        is part of a system which tends to increase Microsoft's future
        revenues and reinforce the barriers to entry protecting Microsoft's
        monopoly. Fisher, 1/11/99pm, at 44:3 - 45:13.

               Fisher, 1/11/99pm, at 44:3 - 45:13.

               Fisher, 1/11/99pm, at 30:8-11 (sealed session).

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vi.

DX 2307.

vii.   Dean Schmalensee repeatedly emphasized

DX 2306; Schmalensee, 1/25/99am, at 29:6-11 (sealed
session). But his chart DX 2307 shows

DX 2307;
Schmalensee, 1/25/99am, at 22:17-22 (sealed session).

38.3.3. Among the five largest OEMs,

i.   According to a chart sponsored by Dean Schmalensee,

DX
2307.

ii.   According to Dean Schmalensee,

DX 2307. In October 1997, Gates
wrote to Kempin, Microsoft's Vice President in charge of OEM
relations, "[o]verall, we will never have the same relationship with
IBM that we have with Compaq, Dell and even HP because of their
software ambitions. I could deal with this just fine if they weren't
such rabid JAVA backers." GX 257.

iii.   Professor Fisher showed, focusing on the same language mix and
time period as Dean Schmalensee, that

GX 1432 (sealed).

D.   Dean Schmalensee's contrary analysis is unreliable

39. Dean Schmalensee testified that Microsoft lacks monopoly power. Refusing to define a relevant market, Dean Schmalensee opined that Microsoft cannot be a monopolist because it does not behave like a monopolist. Dean Schmalensee's analysis is deeply flawed. It is based on suppositions that are contrary to both the evidence and common sense and contradicts his prior writings and testimony.

1.   Dean Schmalensee's approach to market definition is flawed

40. Dean Schmalensee testified that there is no purpose for which defining a market in which Microsoft sells operating systems is relevant (Schmalensee, 1/13/99pm, at 37:12-22). The reasons Dean Schmalensee gave for refusing to define a market, and his objections to the market the plaintiffs defined, are not credible and are unreliable.

40.1. <u>First</u>, Dean Schmalensee testified that assessing market share is "not helpful in an industry like software" because "entry is possible from many known and unknown sources" and a software industry is too "dynamic" to apply the traditional tools of antitrust analysis (Schmalensee Dir. ¶ 187). This reason for refusing to define a market is inconsistent with the testimony Dean Schmalensee gave in the <u>Caldera</u> case, his prior writings, and sound analysis.

40.1.1. In the <u>Caldera</u> case, in which Microsoft is being sued by a producer of a rival operating system, Dean Schmalensee defined a market for Intel-compatible desktop operating systems -- the very market he testified here has no purpose.

i.   Schmalensee, 1/13/99pm, at 29:9-14.

40.1.2. Dean Schmalensee's refusal to define a relevant market in this case also conflicts with his prior writings.

i.   In a paper entitled "Diagnosing Monopoly Power in Antitrust Cases," Dean Schmalensee wrote that "market share has long been the legal touchstone for deciding whether a firm has market power" and that any weaknesses in that approach "do not make a case for abandoning the traditional concern with market share." GX 2335, at page 1.

ii.   In a *Harvard Law Review* article entitled "Another Look At Market Power," Dean Schmalensee quoted an article by Landes & Posner as saying that the "standard method of proving market power in antitrust cases involves first defining a relevant market in which to compute the defendant's market share, next computing that share, and then deciding whether it is large enough to support an inference of the required degree of market power." GX 1514, at 5. Schmalensee endorsed "the basic approach of Landes & Posner" and said that computing market share "can provide information about the importance of market power, but markets differ considerably and shares should be interpreted in light of evidence on market demand elasticities and other conditions." GX 1514, at 9.

40.1.3.   Dean Schmalensee's analysis is, in any event, unsound. Defining

markets and assessing shares is appropriate in this case, and Dean Schmalensee's refusal to do so

leads to analytic errors.

i.   Professor Fisher testified that, although "the question of what is a relevant market in this case, and in most cases, is not a question with very definite answers," it is nonetheless useful because it "is a way of starting to summarize what are the things you have to understand" to determine "the constraints on the alleged monopolist." Fisher, 6/1/99am, at 7:17 - 8:5.

ii.   Professor Fisher testified that, because the critical question in this case is whether Microsoft has "monopoly power in PC operating systems" -- the product Microsoft sells -- it is sensible to begin the analysis by determining whether other products can constrain Microsoft's ability to exercise power over PC operating systems; that is, to determine whether PC operating systems are a relevant market. Fisher, 6/1/99am, at 7:23 - 8:10; see also Fisher Dir. ¶¶ 8-9.

iii.   By contrast, Dean Schmalensee's refusal to define a relevant
market led him to engage in a flawed assessment of barriers to
entry. By "not focusing on market definition to begin with,"
Professor Fisher testified, Dean Schmalensee improperly focused
on ease of entry "into the microcomputer software industry" rather
than the difficulty of entry into Intel-based PC operating systems.
Fisher, 6/1/99am, at 9:3-12. Whether entry into the microcomputer
"industry" is easy says nothing about whether it is easy to offer a
product that can effectively compete against Microsoft's operating
system. Fisher, 6/1/99am, 8:21 - 11:8.

40.2. Second, Dean Schmalensee asserted that the market definition is not useful

here because it is "illogical" to exclude other "platform" products that threaten Microsoft's

position in operating systems -- including Internet browsers and Java -- and platforms are "too

heterogenous" to be a market (Schmalensee Dir. ¶ 336; Schmalensee, 1/13/99pm, at 32:3-17;

Schmalensee, 6/23/99pm, at 58:15 - 59:21). This argument is badly flawed.

40.2.1. It is Dean Schmalensee's analysis that is illogical. By his

reasoning, one could never define a market -- even if it included all of the products (like PC

operating systems) that are substitutes for and compete against one another -- as long as there are

complements for those products (like browsers or other platform software) that other firms could

use to develop new or strengthen existing substitute products.

i.   Under Dean Schmalensee's reasoning, it would be illogical not to
place in the same relevant market:

(1)   an oil refiner in California and a railroad company that is
planning on building a new line into California, if the
railroad could threaten the oil refiner's position by
facilitating the entry into the California market of oil
refined in other States. Fisher, 6/1/99am, at 15:13 - 17:21
(giving example of producer of bulky commodity); or

(2)   a manufacturer of automobiles and a producer of methanol,
if methanol threatens the automobile manufacturer's

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position by facilitating the development of cars that run on methanol. Fisher, 6/1/99am, at 16:5-12.

ii.   In these examples, as Professor Fisher testified, a product (like railroads or methanol) is properly not included in the relevant market -- because it is not a reasonable substitute for products in the market (oil and automobiles) -- even though it threatens to increase competition within that market because it is an important complement that can facilitate growth or entry by products that compete with products in the market. Fisher, 6/1/99am, at 15:7 - 18:11. By contrast, under Dean Schmalensee's reasoning, defining a market in such circumstances would not be a useful enterprise. Schmalensee, 6/22/99pm, at 25:7 - 26:7. Dean Schmalensee's position is untenable because, for example, a market for oil refining plainly can be defined even though railroads may threaten an oil refiner's market power. Fisher, 6/1/99am, at 15:7 - 18:11.

40.2.2.   Although platform products such as Netscape and Java are complements to operating systems, they are not substitutes for operating systems. Thus, even though they pose a threat to Microsoft's dominant position in the personal computer operating system market, they are not in that market.

i.   See supra ¶ 19.1.

ii.   Dean Schmalensee conceded, "conceptually, there is a difference, and an important difference" between operating systems and platforms. Schmalensee, 6/21/99am, at 20:7-10. "An operating system operates the computer...runs the disk drive, runs the printer, manages the interfaces and so forth." Schmalensee, 6/21/99am, at 20:4-6. By contrast, a "platform" exposes "a set of APIs" that can "be used by other software developers." Schmalensee, 6/21/99am, at 19:15.

iii.   Thus, although "operating systems, typically, are platforms" and "many platforms are operating systems" Schmalensee, 6/21/99am, at 20:7, platforms cannot fully substitute for operating systems; see also Gosling Dir. ¶ 8.

iv.   Java and Internet browsers threaten Microsoft's position in operating systems, not because they can develop into another

operating system, but rather because the platform they supply could erode the applications barrier to entry and facilitate the entry and expansion of another operating system. Schmalensee, 1/13/99pm, at 35:5-12 (agreeing that "middleware" is a competitive threat to Windows even though a firm supplying middleware is "not a potential entrant into the business of supplying operating systems that would compete with Microsoft").

v.   Just as a railroad cannot threaten a monopoly oil refiner unless there is another oil refiner whose entry the railroad can facilitate, so Java and Internet browsers cannot threaten Microsoft's position in operating systems unless there are other operating systems on which those "middleware" products can be run. Fisher, 6/1/99am, at 18:5-11 ("In the present case, the growth of the Netscape browser or the widespread use of original Java might have perfectly well have broken down the applications barrier to entry and allowed other operating systems to compete. But it would be the other operating systems that were then on the market, not . . . either Netscape, the browser market, or Sun because of Java."); Schmalensee, 6/23/999am, at 57:14 - 58:3 (conceding that, at present, an operating system is essential to access web-based applications).

40.2.3.   There is no evidence that Java and Netscape constrain Microsoft's

ability to exercise monopoly power today. Thus, even if the market should, as Dean

Schmalensee improperly insists, include "every significant constraint" on "the alleged

monopolist" (Schmalensee, 6/24/99pm, at 60:10-20), Java and Netscape should not be included

in the market.

i.   Dean Schmalensee conceded that what he characterizes as Microsoft's existing competitors are not a significant constraint on its ability to exercise market power. Schmalensee, 1/14/99am, at 23:5-18, 24:16-21.

ii.   Dr. Warren-Boulton testified that, "under the particular economic conditions in this market, I would not expect the prospect of such a threat" to Microsoft's monopoly "in the future to significantly affect current pricing by Microsoft." Warren-Boulton, 11/19/98pm, at 33:6-14.

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40.3. <u>Third</u>, Dean Schmalensee asserted that market share is not useful in an industry

characterized by significant intellectual property protection and low marginal costs

(Schmalensee, 1/20/99pm, at 63:21 - 65:4). This argument ignores both the relevant issue --

whether Microsoft's conduct is constrained by competition from others -- and the importance of

other entry barriers.

i. Professor Fisher testified that "the applications barrier to entry protects Microsoft" "independent" of its intellectual property rights in Windows. Fisher, 6/2/99am, at 14:24 - 15:4. Although a copyright-protected movie cannot prevent new movies from being written, the applications barrier to entry inhibits the entry and expansion of other Intel-based PC operating systems. Fisher, 6/2/99am, at 13:20 - 15:4.

2.   Dean Schmalensee's opinion that Microsoft lacks monopoly power because of low barriers to entry is flawed

41. Dean Schmalensee testified that Microsoft lacks monopoly power because

"Microsoft does not have the protection of substantial barriers to entry" (Schmalensee,

1/14/99am, at 8:22 - 9:9). Dean Schmalensee's reasons for finding the absence of economically

meaningful barriers to entry are flawed and inconsistent with the evidence.

a.   Dean Schmalensee is wrong that the applications barrier to entry is low

42. Dean Schmalensee asserted that "the facts are inconsistent" with the existence of a

high applications barrier to entry (Schmalensee, 6/22/99pm, at 56:9-12). But the evidence is to

the contrary.

42.1. Dean Schmalensee conceded virtually all of the critical facts that underlie

the applications barrier to entry.

i.   Dean Schmalensee conceded that operating systems seeking to substitute for Windows face a "chicken-and-egg problem . . . . Consumers will not use an operating system if there are not enough applications written to it. ISVs will not write applications software for an operating system unless they expect enough customers to use that operating system." Schmalensee Dir. ¶ 100; Schmalensee, 6/23/99pm, at 58:10 - 59:24.

ii.   Dean Schmalensee conceded that most applications are "written for Windows first and sometimes only" for Windows. Schmalensee, 1/13/99pm, at 61:22 - 62:4.

iii.   Dean Schmalensee conceded that Windows has a much larger stock of applications than are available for other PC operating systems and "that the rich set of applications available for Windows contribute significantly to the attractiveness of that platform, and that . . . by itself gives it an advantage over other platforms." Schmalensee, 1/19/99am, at 50:3-12.

iv.   Dean Schmalensee conceded that "to attract as much attention as Microsoft attracts, for a brand new entrant, might require" spending more than Microsoft does. Schmalensee, 1/14/99am, at 16:10-25.

v.   Dean Schmalensee conceded that, because of the absence of sufficient applications available for other operating systems, there is no operating system to which a large OEM presently could switch and that Microsoft could raise the short-term price of Windows. Schmalensee, 1/13/99pm, at 42:16-22, 46:10-12; 6/23/99pm, at 60:9 - 61:4; Schmalensee, 1/20/99pm, at 38:13-17 (agreeing that "if Microsoft were to increase its prices by 10 percent or 15 percent or 20 percent now, it would increase its short-term profits").

vi.   Dean Schmalensee conceded that "switching costs and network effects may be larger for some operating systems than for many applications programs." Schmalensee Dir. ¶ 130.

vii.   Dean Schmalensee conceded that ISVs will not write to a particular operating system unless they believe the expected return will cover the costs ISVs must sink. Schmalensee Dir. ¶ 105; Schmalensee, 1/13/99pm, at 61:10-13 (stating that the "reasons for not porting or not writing to for particular operating system" are "normally business reasons. You write for an operating system if you think it's likely to be profitable to do so.").

viii.   Dean Schmalensee conceded "that the applications programming barrier to entry . . . is something that does, in fact, make it more difficult for people

to enter the business of supplying operating systems." Schmalensee, 1/14/99am, at 9:10-18.

42.2. Despite these concessions, Dean Schmalensee argued that the applications

barrier to entry is low because there is no evidence that rivals face higher costs to compete

effectively than does Microsoft and that any cost disadvantage is not significant (Schmalensee

Dir. ¶¶ 105, 132; 1/14/99am, at 16:14-25; 6/23/99pm, at 11:22). The evidence is inconsistent

with this argument.

      i.   As explained, because of Microsoft's massive installed base, the expected return to ISVs from writing to other operating systems is lower than the return from writing to Windows; other operating system vendors thus face higher costs in inducing a large number of ISVs to write to their operating systems. See supra Part II.B.3., ¶ 27.

      ii.   Because of the collective action problem referred to above, ISVs are very unlikely to write to other operating systems in sufficient numbers to enable those operating systems to become viable substitutes for Windows. See supra Part II.B.3., ¶ 27.2.3.2 -.3.

      iii.   Dean Schmalensee did not analyze "what it would take someone with a hypothetical attractive operating system" to obtain sufficient developer support to duplicate the applications available for Windows. Schmalensee, 1/14/99am, at 14:23 - 15:22.

42.3. In support of his argument that other operating systems do not face a cost

disadvantage in attracting ISVs that prevents effective competition against Microsoft in PC

operating systems, Dean Schmalensee pointed to the recent success of several niche operating

systems, including Linux and BeOS (Schmalensee Dir. ¶¶ 138-40, 158). But the ability of Linux

and BeOS in attracting both developer attention and consumer interest has been limited and thus

confirms, rather than undermines, the existence of the applications barrier to entry.

42.3.1. BeOS is marketed as a specialized complement to Windows

because it lacks the range of applications necessary to substitute for Windows.

i.   BeOS's founder, Jean Louis Gassée, stated: "'We don't want to compete directly with Microsoft to be the only operating system on the PC . . . but we can be complementary.'" GX 568 (quoting Gassée). Dr. Warren-Boulton testified that BeOS is a complement, rather than a substitute, for Windows. Warren-Boulton, 12/1/98am, at 45:5 - 49:10.

ii.   Thus, BeOS is being loaded by OEMs not instead of Windows, but together with Windows "as a 'dual boot,' letting users switch between the two as needed." GX 568.

iii.   Although Dean Schmalensee asserted that BeOS's strategy of becoming a complement to Windows through "dual boot" was merely a stepping stone to challenging Windows (Schmalensee, 1/13/99pm, at 54:8-25), that testimony is undermined by his later testimony that there is no substantial demand for dual boot systems. Schmalensee, 6/23/99pm, at 62:2-23.

42.3.2. Linux is principally marketed as a server operating system, and its

employment as a desktop operating system is confined to specialized tasks because its lacks

applications comparable to Windows'.

i.   The CEO of Red Hat, an important Linux vendor, stated that Red Hat Linux "is almost exclusively being used today to run specialized server computers that distribute data on the Internet or internal corporate networks." GX 1568. He further added: "Just because we exist doesn't mean Microsoft doesn't have a monopoly with desktop machines. It's like a telephone company executive holding up a walkie-talkie and saying this is a competitor to local phone service." GX 1568.

ii.   The President and CEO of Caldera, another Linux vendor, testified that Caldera's OpenLinux product does not compete with Windows 95, and that Caldera does not "have the application base to really compete as a desktop" with Windows. Warren-Boulton, 12/1/98am, at 50:4 - 51:15 (play Sparks deposition); see also Warren-Boulton, 12/1/98am, at 56:17 - 57:16 (to the extent Linux

is competing with Microsoft, it is competing in the server market; Caldera does not view itself as a competitor in the desktop market because it does not have the necessary stock of applications).

iii.   An IBM executive stated: "The limiting factor for Linux breaking into the desktop area right now is simply the lack of available applications written for the operating system." GX 2091. He explained that "users tend to deploy Linux for smaller, simpler tasks rather than for huge, enterprise-scale transactions." GX 2091. Another IBM executive added that, although "it is technically possible to install Linux on an IBM thinkpad," there "are just not enough applications to make it worthwhile." GX 2091.

iv.   Dean Schmalensee conceded that Linux is "not a major competitor today." Schmalensee, 1/13/99pm, at 45:23. Although Dean Schmalensee also asserted that "the majority of sales of Linux" are "for desktops" (1/13/99pm, at 73:18-19), he later contradicted that testimony, conceding that the "bulk" of Linux users "at present are" using Linux on "servers." 6/23/99pm, at 66:5 - 67:5.

v.   Although a small number of OEMs are offering Linux on some portions of their line (DX 2434 (reporting that Dell is offering Linux)), a representative of another prominent OEM stated: "We see Linux as a server phenomenon right now more than a desktop phenomenon." GX 2091.

42.3.3. Thus, although Linux and BeOS have attracted some developer attention, consistent with the applications barrier to entry, they have not attracted sufficient developer attention to provide an effective substitute for Windows for a large number of users.

i.   As explained, BeOS and Linux have thousands of fewer applications available than Windows. See supra Part II.B.3., ¶ 26.1.3.

ii.   Dr. Warren-Boulton testified that although BeOS is a viable "specialized" niche operating system, it cannot effectively substitute for users because it lacks the "extraordinary width of applications available . . . on Windows." Warren-Boulton, 11/23/98am, at 18:8-22. Dr. Warren-Boulton further testified that the absence of applications prevents Linux from gaining substantial

market share, and that only the advent of a large stock of cross-platform applications could Linux present substantial competition to Windows. Warren-Boulton, 12/1/98am, at 57:8 -59:4.

iii. Bill Gates reportedly stated regarding Linux: "Like a lot of products that are free, you get a loyal following even though it's small. I've never had a customer mention Linux to me." GX 1378.

iv. Bryan Sparks testified that Linux cannot effectively compete with Windows because it "just" doesn't "have the applications base to really compete as a desktop." Warren-Boulton, 12/1/98am, at 51:12-15 (playing Sparks deposition).

v. An IBM executive explained: "The limiting factor for Linux breaking into the desktop area right now is simply the lack of available applications written for the operating system." GX 2091. Another added that, although "it is technically possible to install Linux on an IBM thinkpad," there "are just not enough applications to make it worthwhile." GX 2091.

vi. Professor Fisher testified that "Linux is going to remain a quite successful niche operating system for some time to come, and it's not in fact going to offer a serious threat to Microsoft." Fisher, 6/3/99pm, at 25:14-17.

42.3.4. The existence of niche operating systems, such as Linux and

BeOS, is entirely consistent with Microsoft's possession of monopoly power; and Dean

Schmalensee is wrong when he argues that, if the applications barrier to entry is high, other

operating systems vendors or vendors of other platform products that also can be complements to

Windows are "wasting their time" seeking to attract developers (Schmalensee, 6/23/99am, at

23:16 - 27:10; 1/13/99pm, at 55:1-22).

i. Professor Fisher testified: "It's well-accepted that a firm can have monopoly power with a fringe of competitors." Fisher, 6/1/99am, at 22:4-17.

ii. Professor Fisher further testified that it is not sufficient to overcome the applications barrier to entry "that there may be some ISV's or even many ISV's that will write to operating systems other than Windows" because "what makes the applications barrier to entry so severe" is "the breadth and depth of the numerous applications that are written or Windows." Fisher, 6/1/99am, at 55:15 - 56:19.

iii. Dr. Warren-Boulton testified that the fact firms are porting to Linux shows that they are betting Linux will be profitable, not that Linux will substitute for Windows. Warren-Boulton, 11/19/98pm, at 99:7 - 100:4.

iv. Dr. Warren-Boulton testified that "the existence of fringe competitors that are in the operating system market does not mean in any way that Microsoft does not have monopoly power" because of the applications barrier to entry. Warren-Boulton, 11/19/99am at 19:16 - 20:3.

42.3.5. Any threat Linux and BeOS pose to Microsoft's position is

speculative and does not prevent Microsoft from enjoying monopoly power today.

i. The CEO of Red Hat, a leading Linux vendor, stated: "We are absolutely not a viable competitor" to Windows "at this time. We have every intention of being one, but how long will that take? Realistically, it will be 20 years." GX 1568.

ii. Dean Schmalensee conceded that Linux is not a significant constraint today on Microsoft's ability to exercise power and cannot predict when it will exert such a constraint. Schmalensee, 1/13/99pm, at 52:25 - 53:8; 1/14/99am, at 23:16-25. He conceded that he had made no estimate of how many PCs have Linux preinstalled now or will have Linux preinstalled in the future. Schmalense, 6/23/99pm, at 65:17-24. Dean Schmalensee testified that he didn't "pretend to be able to forecast" whether there will be substantial demand for Linux in the future. Schmalensee, 6/23/99pm, at 73:7-12.

iii. Dr. Warren-Boulton testified that: "I have absolutely no evidence that Microsoft's pricing" of Windows "is constrained by perceived or actual competition" including "the availability of Linux." Warren-Boulton, 11/19/98pm, at 96:20 - 97:1.

42.4. Dean Schmalensee is wrong that, even if other operating system vendors face substantially higher costs than Microsoft faces today, that does not amount to an entry barrier because an entry barrier exists only if the costs to a rival operating system today are higher than the costs Microsoft incurred when it entered (Schmalensee, 6/22/99pm, at 62:8-20).

42.4.1. For one thing, this definition of a barrier to entry contradicts the approach to entry barriers taken by Dean Schmalensee elsewhere in his testimony and in his prior writings.

i. Dean Schmalensee described as "broadly consistent" with his definition of barriers to entry the proposition that a barrier to entry is any factor that "permits a firm already in the market to earn returns above the competitive level while deterring others from entering." GX 1516; Schmalensee, 1/14/99, at 6:17 - 7:19. And he testified that a barrier to entry exists if there are factors that "disadvantage . . . firms that otherwise would be capable of competing efficiently." Schmalensee 1/21/99am, at 33:2-5; 6/22/99pm at 70:3-24 (testifying that a barrier to entry exists if the rival cannot "attract the resources to expand and to become competitive").

ii. Dean Schmalensee previously wrote that: "In general, a clear signal of low barriers is provided only by effective, viable entry that takes a nontrivial market share . . . ." GX 1513 ((Richard Schmalensee, *Ease of Entry: Has the Concept Been Applied Too Readily*, 56 ANTITRUST L.J. 41, 42 (1987)).

42.4.2. Moreover, successful entry into PC operating systems is much more difficult today than 15 years ago. The network effects that underlie the applications barrier to entry are much larger today than when Microsoft entered because PC penetration (the percent of potential PC users who already use PCs) is higher and Microsoft is a well-established incumbent with a dominant market share.

i. Professor Fisher testified: "When Microsoft won the network battle, when Windows became the dominant operating systems, there were . . . many fewer P.C.'s, and there was no incumbent operating system of equal power and importance. There were, of course, other operating systems to fight and there were other operating systems to, as it were, overcome. One of them, of course, was Microsoft's own operating system, DOS. The cost after . . . after Microsoft's victory . . . of persuading ISV's to build such a stock rather than write for Windows has got to be much more substantial than it was for Microsoft to persuade them" to write for Microsoft operating systems "in the first place." Fisher, 6/1/99am, at 53:6 - 54:1. In other words, "the economy of scale" that underlies the applications barrier to entry "is bigger now." Fisher, 6/1/99am, at 54:2-10. See also Fisher, 6/1/99am, at 56:14 - 58:18 (Although there might be some incentive for ISVs breaking into the market to write for new operating systems, that is not enough to induce ISVs in general to write to other operating systems such that they can substitute for Windows.)

ii. Demonstrating the increased penetration of PCs, Microsoft's own documents show that its shipments of operating systems rose from 11.4 million units in 1990 to 51.9 million units in 1996. GX 439.

iii. Dr. Warren-Boulton testified that, when Microsoft entered the operating system market, the applications barrier to entry was not comparable to that which potential entrants face today. He explained: "[C]ompare the difficulty there with the difficulty today where you are faced with an incumbent with tens of thousands of API's, a huge stock of applications--trying to play catch-up at that point, it's just very difficult." Warren-Boulton, 11/24/98am, at 48:17 - 49:6.

42.5. Dean Schmalensee's assertion that the history of competition for operating systems shows that the category is easily contestable and that "inflection" points that displace rivals occur frequently is also belied by the evidence and his prior writings.

42.5.1. Dean Schmalensee previously observed that the "fact that entry has occurred in the past does not imply there are no barriers to entry or that entry is necessarily easy."

i. GX 1513 (*Ease of Entry* Article).

42.5.2. The evidence shows not, as Dean Schmalensee claims, frequent

displacement of a dominant firm, but rather Microsoft's demonstrated ability to perpetuate its

market power.

     i.   Microsoft, according to Dean Schmalensee's own analysis, has had the dominant PC operating system since at least the late 1980s. Schmalensee Dir. ¶¶ 118-119.

     ii.   Microsoft has maintained that dominance notwithstanding the development of, among other things, (i) the graphical user interface; (ii) the migration of PC operating systems from 16-bit to 32-bit chip architecture; and (iii) the advent of the Internet, all of which Microsoft claims to be "inflection points." Maritz ¶ 15.

     iii.   Professor Fisher testified after being asked about the history of users switching operating systems that while "it's true that users would switch to [another] operating system if they perceived there to be a significant advantage," the "problem is that because of the network effects or what's sometimes been termed the applications barrier to entry, users are not very likely to perceive that in the present circumstances of Windows. And Microsoft does its best to see that they won't." Fisher, 1/6/99am, at 81:25 - 82:10.

42.6. That Microsoft, like other operating system vendors, must continue to

attract ISV attention and improve its product (Schmalensee Dir. ¶ 160; Maritz, 1/28/99pm, at

6:13 - 7:9) is entirely consistent with a high applications barrier to entry and with market power.

42.6.1. Because of its large installed base, the costs to Microsoft to attract

sufficient ISVs to make its operating system broadly attractive to users are far less than the costs

to its rivals.

     i.   See supra Part II.B.3., ¶¶ 25-27.

42.6.2. Because of its ability to ensure "backward compatibility,"

Microsoft can migrate its installed base between its operating system releases, thus perpetuating

its advantage and, hence, the applications barrier to entry.

> i. Rational's Mike Devlin testified that, "because Microsoft strives to make its operating system product 'backwardly compatible,' we (and our customers) know that a program we write using the APIs for one Microsoft operating system will likely run on its successor." Devlin Dir. ¶ 15.

> ii. Microsoft executive Ben Slivka wrote: "Regardless of all the cool, sexy features in OS/2 (multi-tasking, better graphics API, memory protection), it was not a no brainer upgrade from MS-DOS -- customers had to **give something up** in order to switch to OS/2: their existing software! Only with Windows 95 (where we have focused on compatibility to an amazing extent) are we finally going to enable to move customers away from MS-DOS." GX 21, at MS98 0102396 (emphasis in original).

42.6.2.1. Microsoft's efforts to attract ISVs are consistent with monopoly

power because monopoly power does not mean unlimited power, because even a monopolist has

an incentive to increase demand for its product, and because attracting ISVs reinforces the

applications barrier to entry.

> i. See infra ¶ 50.

> **b.** **Dean Schmalensee's contention that entry into the microcomputer software industry is easy is a red herring**

43. Dean Schmalensee argues that "there are no barriers in the microcomputer software

industry that prevent" new entry (Schmalensee Dir. ¶ 37). But whether entry into the

microcomputer software industry as a whole is easy is beside the point because the relevant

question is not whether entry into the "industry" is easy or even whether producing a PC

operating system is easy, but rather whether producing an operating system with sufficient

applications to challenge Windows is easy.

   i.   Professor Fisher testified: "This case . . . centers on monopoly power in the
           market for PC operating systems. The question of entry into the microcomputer
           software industry in general is not relevant." Fisher, 6/1/99am, at 9:3-17; Fisher
           6/1/99am, at 23:6-20.

   ii.   As Professor Fisher further explained, there is no evidence that the microcomputer
           industry in general does or could constrain Microsoft's ability to exercise
           substantial market power over PC operating systems. "To take a simple but
           illuminating example, Nintendo produces games. Games are in the
           microcomputer software industry," but they are "not a constraint on Microsoft's
           power in . . . pricing its Windows operating system." Fisher, 6/1/99am, at 10:3-7.

   iii.   Nor is the fact that others in the microcomputer industry could hire programmers
           and produce a PC operating system relevant. Those firms are "not going to be
           able to produce an operating system with those programmers, or with other
           programmers, which can overcome the economies of scale and the network
           externalities that are required." Those firms are "not going to be able to produce
           an operating system which attracts a very large number of applications writers,
           enough to overcome Microsoft's very commanding lead." Fisher, 6/1/99am, at
           10:23 - 11:6.

   44. The factors that, according to Dean Schmalensee (Schmalensee Dir. ¶ 95), make

entry into the "microcomputer software industry" easy are not enough to overcome the

applications barrier to entry into personal computer operating systems.

       44.1. That the microcomputer software industry has abundant skilled

programmers and a ready supply of capital cannot, as Microsoft implies (Schmalensee Dir. ¶¶ 39-

44), overcome the economies of scale that create the applications barrier to entry.

           i.   As explained, the evidence shows that, despite the ready availability of
                   programmers and capital, the economic incentives to write for niche
                   operating systems are insufficient to warrant sinking the huge costs
                   necessary to create an operating system and set of applications capable of
                   substituting for Windows for a large number of users. See supra Part
                   II.B.3.b; ¶¶ 25-31.

ii.   Professor Fisher testified that "if there were no other barrier to entry into operating systems . . . acquiring programmers and financing and so forth wouldn't be a problem" but there nonetheless "is a very substantial barrier to entry. I suppose it would be harder to get in if it weren't easy to get programmers, but getting good programmers is not near enough to get into the P.C. operating system business." Fisher, 6/1/99am, at 23:21 - 24:4.

iii.   Dr. Warren-Boulton testified that although there appears to be no capital entry barrier (Warren-Boulton, 11/19/98pm, at 65:25 - 66:6), the applications barrier to entry presents a huge entry barrier. Warren-Boulton Dir. ¶ 59.

44.2.   Microsoft's argument that rivals can overcome the applications barrier to entry by mimicing the Windows user interface and cloning the Windows APIs is inconsistent with the evidence. To the contrary, cloning the Windows APIs is infeasible because the number of APIs is very large and constantly changing.

i.   John Soyring of IBM testified: "Not only is it difficult to reliably duplicate the function of each API, another company can not realistically duplicate the function of all of the APIs since Microsoft continues to introduce new APIs. Applications will not work correctly if they use APIs whose functions have not been duplicated. Therefore, there will always be a risk that some application important to a user now -- or in the future -- will fail. This uncertainty places a heavy drag on any chance for long-term success. Given the expense, time and uncertainty involved, I do not think supporting Windows applications on another operating system for desktop or mobile PCs offers any reasonable opportunity for a positive financial return, and I would not recommend that IBM attempt to provide additional support for Windows applications in OS/2." Soyring Dir. ¶ 13. Soyring further testified that, because IBM "lacked the technical capability or the legal rights" to Microsoft's Windows 95 source code, it could not ensure that Windows applications would run on OS/2. Soyring, 11/17/98pm, at 76:4-20.

ii.   Bryan Sparks of Caldera, a Linux vendor, testified that "writing a Windows compatible operating system that's capable of running Windows applications without Microsoft's supplied operating system is very difficult. We tried that for sometime in a sister company when I was at Novell, and we just determined that the breadth of API's is astonishing"

and that Microsoft "adds API's at what we perceive as an incredible rate, and keeping up with that API and developing a compatible product is very, very difficult. And even if you created that, you'd have a hard time branding it as an acceptable platform because of the breadth of the API." Sparks Dep. (played 12/1/98am), at 52:15 - 53:25.

iii.   Microsoft's Joachim Kempin noted in December 1997 that cloning the Windows APIs "would be a lot of work and potentially" pose "patent problems for someone attacking us." GX 61. Bill Gates understood that the more difficult a technology is to clone, the more control over it Microsoft would have; in discussing Microsoft's strategy for its HTML rendering engine (code named "Trident"), Gates wrote: "I think we want to make Trident extremely hard to clone. I think we want to patent elements of Trident. I think we want to make extensions to Trident on an ongoing basis." GX 351.

iv.   Dr. Warren-Boulton testified: "Certainly, at this point, cloning . . . in the sense of developing an operating system which would provide the complete set of API's that is in Windows 98, is physically almost impossible and, as a practical business matter, is not reasonable." Warren-Boulton, 11/19/98pm, at 29:13-21.

c.   Dean Schmalensee is wrong in arguing that the existence of potential threats to Windows shows that barriers to entry are low

45.   Dean Schmalensee argued that the threat to the applications barrier to entry posed by

Internet browsers and Java is inconsistent with the conclusion that entry barriers are high

(Schmalensee, 6/22/99pm, at 71:6 - 74:17). This testimony is misconceived.

i.   As Professor Fisher testified, the fact that barriers to entry might someday be eroded, whether by Internet browsers, Java, or other threats, known or unknown, does not affect whether Microsoft has monopoly power today. Fisher, 6/1/99am, at 14:9- 15:6; 6/1/99am, at 25:25 - 26:18.

ii.   Dean Schmalensee's position, as Professor Fisher testified, proves too much. It implies that "any monopolist who took action to preserve its monopoly and saw a threat worth taking action would be able to argue successfully that the fact it took the actions means that it can't have monopoly power." Fisher, 6/1/99am, at 13:12-20.

iii.   Microsoft has taken steps to ensure that these threats cannot overcome the
        applications barrier to entry, and its conduct has reinforced the already substantial
        entry barriers. Fisher, 6/1/99am, at 12:9-17; Fisher, 6/1/99am, at 60:4 - 62:2;
        Fisher, 6/1/99am, at 66:9-25.

46.   The possibility that other information applications might eventually wrest some

business away from personal computers similarly does not show, as Microsoft argues (Maritz ¶¶

104, 275-77), that entry barriers are low.

46.1. First, other devices, as explained, do not constrain Microsoft's ability to

exercise power over PC operating systems and thus do not affect whether Microsoft has

monopoly power.

i.   See supra Part II.B.2; ¶ 19.

46.2. Second, even if other devices were to become better substitutes for some

PC uses and gain wider use, that would affect only the value or size of Microsoft's monopoly

power, not its existence. In any event, the evidence shows that demand for PCs, and thus the

value of Microsoft's monopoly, will if anything increase.

i.   See supra Part II.B.2; ¶ 19.

ii.   Steve Ballmer recently stated that the "PC will remain a very important
        central device to the way computing happens, in our view, over the course
        of the next ten years." GX 2301, at 4. He further commented that he
        could "accept the notion of new devices. I just don't accept the idea that
        the PC goes away. And so while other things, other environments may
        grow up faster, the PC stays important." Id. at 5.

iii.   Bill Gates wrote in May 31, 1999, opinion piece for Newsweek that,
        "despite pundits who had predicted the end of personal computers, sales
        continue to rise."   He concluded: "For most people at home and at work,
        the PC will remain the primary computing tool." GX 2059.

iv.   The very report Microsoft introduced in support of its contention that
        information appliance shipments will soon overtake PC shipments in fact

shows the opposite. It states: "When viewed in its all-encompassing scale, with all form factors and all customer segments, PC's far out-ship information appliances on a unit basis . . . and dwarf the market on a value basis." DX 2423, at page 6. As Professor Fisher testified, the report shows "that the PC isn't going away" but, to the contrary, will "remain extremely important" and that Microsoft's "[m]onopoly over PC operating systems will, therefore, continue to be important." Fisher, 6/3/99pm, at 69:14-18; see also GX 2082 (IDC chart showing that number of PC units shipped is expected to continue to grow significantly until at least 2002, and that despite slightly faster growth in shipments of information appliances, in 2002 there will still be several tens of millions more PC units shipped); GX 2083 (IDC chart showing that the expected value of PC units shipped will remain vastly larger than the expected value of shipments of other information appliances until at least 2002).

v.   Steve Case testified, "'It's hard[] to imagine that PCs won't be the dominant way people connect with the internet for many years to come and Microsoft has a pretty amazing lock on that business . . . .   Other devices will emerge, but I doubt any will challenge Windows.'" Fisher, 6/4/99am, at 44:17 - 45:4 (quoting Case Dep. (quoting Ct. Ex. 1) (citation omitted)). Case further testified that AOL "'[h]as no intention of battling Microsoft's core business'" and "'no flight of fancy that [AOL] can dent in any way, shape or form what is a Microsoft monopoly in the operating system business.'" Fisher, 6/4/99am, at 43:19 - 44:16 (quoting Case Dep. (quoting Ct. Ex. 1)).

46.3. Third, other devices could threaten Microsoft's monopoly only if PCs were

effectively eliminated as an important computing device. The evidence shows precisely the

opposite: that demand for PCs will remain robust for the foreseeable future.

i.   Professor Fisher testified: "So long as PCs remain an important computing device, and a device which has the property that you need them to do certain applications," that "[o]ne cannot imagine" that "a small change in the price of the Windows operating system is going to cause a lot of people to abandon PCs and go to these other devices."   Fisher, 6/3/99pm, at 82:4-19, 65:23 - 66:6. Professor Fisher rejected the proposition "that the possible innovations in various other devices" will "reduce the problem of Microsoft's monopoly." Fisher, 6/1/99am, at 28:12-15.

ii.   Professor Fisher further testified: "Microsoft has monopoly power over operating systems for PCs. The question of the influence of other devices,

in this case information appliance devices, would only become relevant to Microsoft's monopoly power over PC operating systems if it did one of two things, and I don't think either one is going to happen. One is that information appliance unit shipments would become so big and so widespread that people would drive . . . PCs out." "This chart" DX 2423 "shows PC shipments growing and continuing to grow, and it matches the obviously sensible proposition that PCs are going to continue to be important and indeed very important." Fisher, 6/3/99pm, at 65:9-22.

iii.   Further evidence that PCs will continue in importance is the fact that non-PC devices cannot be used to accomplish tasks for which PCs are necessary. For instance, Microsoft pointed to gaming console as a source of possible competition to PCs (Fisher, 6/2/99pm, at 72:21 - 76:19); but the very exhibit Microsoft introduced states that "'the new Sony machine will not process text or calculate a budget.'" Fisher, 6/3/99pm, at 72:15-17 (quoting DX 2553). It further reports: "Sony executives went to some pains today to assert that their new machine was not a competitor to Wintel, the combination of Microsoft corporation's Windows operating system and Intel's pentium microprocessors that dominates the personal computer industry." DX 2553.

iv.   Dean Schmalensee does not have a basis to opine that Microsoft's monopoly will be extinguished by the existence of other devices. When asked whether he had reached a judgment about "the extent to which" the "personal computer operating system will continue to be an important business going forward into the future," he responded that he was being tempted "to prophesy again," and that "from everything" he had "seen, at least for some number of years -- and it would be hard to say how many -- . . . a lot of work will be done on the desktop using desktop equipment. How much, how fast, how the trends will go, I don't know, but it seems apparent to me that for some time to come," the PC operating system "will be an important business." Schmalensee, 6/23/99pm, at 41:15 - 42:14.

47. Dean Schmalensee's speculation that operating-system neutral, web-based applications developed on the Internet could some day erode the applications barrier to entry (Schmalensee, 6/23/99am, at 36:15 - 41:22) also does not mean that Microsoft lacks monopoly power.

47.1. First, the possible development of a range of web-based applications even
roughly comparable to the set of applications available for Windows is entirely speculative.

      i.   Bill Gates wrote, with regard to AOL's acquisition of Netscape, "Platform threat - AOL doesn't have it in their genes to attack us in the platform space." GX 2241, at MS98 0231890 (sealed; cited portion published).

      ii.   Dean Schmalensee conceded that he performed no study or analysis to determine how many web-based applications exist or how much investment in that area has been made.   Schmalensee, 6/23/99am, at 49:16 - 50:23; Schmalensee, 6/23/99pm, at 37:15 - 38:10.

      iii.   Dean Schmalensee conceded that he performed no study of the number of web-based applications that require Windows. Schmalensee, 6/23/99am, at 54:21 - 55:9.

      iv.   Dean Schmalensee, when asked if "there will come a time in the future when people will spend as much effort developing web-based applications as they do developing applications for Windows" responded: "I'm not a prophet . . . . I cannot, as I sit here, represent that I know what will happen in this regard in the future." Schmalensee, 6/23/99pm, at 38:18 - 39:2; Schmalensee, 6/23/99pm, at 39:13 - 40:1 ("one extrapolates current trends with some hazard in this business, and as I say, I'm not a prophet").

      v.   Dean Schmalensee conceded that he did not, and could not, determine the number of web-based applications would exist in the next couple of years. Schmalensee, 6/23/99am, at 50:24 - 51:7.

      vi.   Professor Fisher testified that he conducted no study of the number of web-based applications because "however interesting those applications are they are nowhere near enough to overcome the . . . applications barrier to entry into operating systems for PCs." Fisher, 6/3/99pm, at 81:6-15.

47.2. Second, because web-based applications require a browser, Microsoft could
vitiate this potential threat by gaining a substantial share of browsers and then using proprietary
extensions.

      i.   See infra Part VII.D.

48. Dean Schmalenee is also wrong in arguing that the possibility of entry should be assessed "over a long period of time," beyond the next several years (Schmalnesee Dir. ¶ 184).

      i.   As Professor Fisher testified, this argument confuses the question of the period over which Microsoft could recoup predatory investments designed to preserve its monopoly power with whether that power exists. For example, under Dean Schmalensee's reasoning, one could not determine whether AT&T was a monopolist in 1980 without considering "the telephone industry well into the next millennium because it is possible that if it succeeded in driving out MCI, it would still recoup money 30 years later." Fisher, 6/1/99am, at 18:12 - 20:10-15.

3.   Dean Schmalensee's contention that "long term threats" prevent Microsoft from exercising monopoly power today is flawed

49. Dean Schmalensee bases his argument that barriers to entry are low, and thus that Microsoft lacks monopoly power, principally on his contention that Microsoft's pricing of Windows is severely constrained by largely unknown long-term threats to its position. Dean Schmalensee reasons that, if Microsoft were a monopolist, it would be charging more than $1,800 for Windows, instead of the approximately $70 it in fact charges, and infers from this that Microsoft is engaging in massive limit pricing designed to exclude threats that have not yet arisen (Schmalensee, 1/21/99am, at 11:17-18, 13:11-19, 23:25 - 24:5). The evidence, however, is at odds with Dean Schmalensee's argument.

      49.1. <u>First</u>, limit pricing -- lowering price and thus sacrificing revenues today in order to deter entry tomorrow -- is irrational if potential rivals know that the firm can lower price later, if and when competition emerges. In that event, rivals will be deterred by the prospect of price reductions in response to competition, and there would be no reason for the monopolist to sacrifice revenues by cutting prices today. Dean Schmalensee's limit-pricing analysis thus must

assume that Microsoft cannot credibly threaten to lower price in the future. Microsoft, however,

plainly has the power to lower prices in the future, if and when competition emerges.

> i. Professor Fisher and Dr. Warren-Boulton both testified that it is not
> plausible that Microsoft keeps the price of Windows significantly lower
> than Microsoft otherwise would in order to deter entry because Microsoft
> can lower its price should such entry occur. Potential entrants evaluate the
> profits they would earn after entry, and they recognize that Microsoft's
> price now is not a guide to what Microsoft would charge -- and what
> profits are therefore available to the entrant -- if entry actually occurred.
> Fisher, 6/2/99am, at 6:2 - 7:14; Warren-Boulton, 12/1/98am, at 43:14 -
> 45:5.

> ii. Microsoft can credibly lower price tomorrow in response to entry because,
> as Dean Schmalensee himself testified, the marginal cost to Microsoft of
> producing and selling additional copies of Windows through an OEM is
> "zero." Schmalensee, 1/20/99pm, at 68:5-20; Warren-Boulton,
> 11/19/98am, at 58:25 - 59:3; Schmalensee Dir. ¶ 85.

> iii. Dean Schmalensee asserted that the greatest threats to Windows'
> dominance are not other PC operating systems, but rather "paradigm
> shifts." Schmalensee, 1/13/99pm, at 65:7-24. But there is no reason to
> think that the possibility of "paradigm shifts" is affected by the prices
> Microsoft charges today. Fisher, 1/11/99pm, at 47:19 - 48:17.

49.2. Second, Dean Schmalensee's hypothesis that Microsoft is engaging in

massive limit pricing is also inconsistent with how Microsoft views the constraints on its pricing

of Windows.

> i. Kempin testified that he did not consider competing operating systems or
> "'competition more generally'" in setting the Windows 98 royalty. See
> supra Part II.A; ¶ 15.1.5.

> ii. Kempin's memorandum on Microsoft's pricing of Windows 98, sent to
> Bill Gates, does not identify long-term threats as a constraint on
> Microsoft's pricing of Windows. Long-term threats are described instead
> as possibilities that could "derail" Microsoft's strategy. GX 365.

> iii. Based on this evidence, Professor Fisher testified that long-term entry is
> not a significant consideration in Microsoft's choice of a price for

Windows. Fisher, 1/13/99am, at 23:5-14 (it is doubtful "long-term entry . . . is . . . at the forefront of the Microsoft corporate mind").

49.3. Third, the analysis Dean Schmalensee advanced says nothing about whether Microsoft possesses monopoly power. To the contrary, Dean Schmalensee's analysis (Schmalensee, 6/23/99am, at 6:3 - 9:17) shows, at most, that Microsoft is not seeking to maximize its short-term profits exclusively through operating system royalties.

     i.   Professor Fisher testified that Dean Schmalensee's analysis at most could show only that Microsoft is not taking out its monopoly power in the short-run price of Windows. Fisher, 1/12/99pm, 16:12 - 17:17. But it "wouldn't tell you anything about the power itself. It wouldn't tell you whether Microsoft had power. It would tell you whether it was exercising power in a particular way." Fisher, 6/1/99pm, at 9:3-12; Fisher, 1/11/99pm, at 48:13 - 50:19 (even if one concluded that Microsoft had priced to deter future entry, that would not necessarily mean that Microsoft lacks monopoly power today).

49.3.1. An analysis that focuses entirely on short-run prices is inappropriate because it ignores the fact that Microsoft may charge what seems like a "low" short-term price in order to maximize its profits in the future for reasons unrelated to deterring entry.

49.3.1.1. By keeping price low today and "growing" the market, Microsoft earns greater complementary revenues in the future.

     i.   Paul Maritz testified: "Microsoft broadly licenses operating system products to computer manufacturers at attractive prices (typically less than 5% of the price of a new computer). Such broad licensing promotes the adoption and use of Microsoft's operating system products, which in turn promotes the development of a wide range of useful complementary hardware and software products that are compatible with Windows and thus with other Windows-related products." Maritz Dir. ¶ 132.

ii. Professor Fisher testified that a monopolist like Microsoft has a greater incentive than a nonmonopolist would to set a low price with the purpose of furthering the general popularity of computing because only the monopolist reaps the full future reward of the greater popularity. Fisher, 1/12/99pm, 66:4 - 67:9, referencing colloquy at Fisher, 1/12/99am, 24:13 - 25:21.

iii. Professor Fisher further testified that, because Windows users often buy upgrades and other complementary products from Microsoft in years after their initial Windows purchase and because the number of copies of Windows sold has grown every year, Microsoft earns greater complementary revenues per copy of Windows than can be captured in Dean Schmalensee's equation. Fisher, 6/4/99am, at 13:23 - 15:3. Dean Schmalensee improperly compared current Windows revenues to current revenues from complementary products. Fisher, 6/4/99am, at 13:23 - 15:3.

iv. In fact, Dean Schmalensee did not investigate the complementary revenues Microsoft receives from the sale of Windows. Rather, he accepted his staff's representation that Microsoft "record[s] operating system sales by hand on sheets of paper" and, for that reason, lacked "a sophisticated internal accounting system" from which he could estimate anticipated complementary revenues. Schmalensee, 1/20/99pm, at 46:3 - 49:8.

49.3.1.2. Dean Schmalensee ultimately conceded that Microsoft

may be pricing low today to obtain long-term benefits that depend on network effects.

i. Dean Schmalensee testified that Microsoft "keeps price low so that a lot of people use Windows, and I can attract applications vendors for both reasons, both because a lot of people use it and because there are more applications for it." Schmalensee, 6/22/99pm, at 39:13-18.

ii. In this regard, Dean Schmalensee's testimony is consistent with Professor Fisher's testimony that Microsoft has "an overriding interest in preserving the applications barrier to entry and taking advantage of the network effects. When it

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sells Windows, the more Windows it sells, the more the network effects are. That, by the way, is a reason for keeping the price of Windows lower than would otherwise be the case, and there are other reasons as well." Fisher, 1/12/99am, at 21:8-14.

      49.3.1.3. Dean Schmalensee's focus on short-term price also

overlooks the fact that Microsoft takes a portion of its monopoly returns, not in cash payments,

but rather in the form of costly restrictions upon its customers and commitments by them to

behave in ways that augment and maintain Microsoft's monopoly power.

i.	Professor Fisher testified that Microsoft "takes some of its profits in the form of protection of its monopoly." Fisher, 1/12/99am, at 19:20-21. Professor Fisher further testified that there are examples in other industries of sellers with monopoly power choosing to exercise that power by means other than charging as high a price as possible for the monopolized product; in the late 1970s, for example, the two airlines that owned computer reservations systems found it more profitable -- before the Civil Aeronautics Board intervened -- to raise rival airlines' costs by biasing the systems' flight displays than to raise the price to those airlines of participating in the systems. Fisher, 1/12/99am, at.14:11 - 17:3.
ii.	

GX 1498, at GW 019843 (sealed).

iii.	Garry Norris of IBM testified that some of Microsoft's MDA milestones require IBM to take acts that exclude Microsoft's potential rivals. Indeed, Norris testified, referring to the language in his contemporaneous notes of their March 6, 1997 meeting, that Microsoft's Bengt Akerlind told IBM "no Netscape and receive more MDA dollars across the P.C. company" and threatened IBM with "MDA repercussions" unless IBM agreed to promote IE exclusively. Akerlind told Norris that Microsoft might impose these repercussions, i.e., raise the price of Windows

to IBM, either by modifying MDA milestones themselves or by exercising its discretion to decide whether IBM had met its MDA milestones. GX 2164; Norris, 6/8/99am, at 29:19 - 30:23; Norris, 6/8/99am, at 31:24 - 32:12.

iv.

GX 1436
(sealed).

Fisher 1/12/99pm, 41:19 - 43:20
(sealed session).

v. Microsoft offered IBM substantial MDA discounts to reduce support for OS/2; had IBM accepted the provisions offered by Microsoft, Microsoft's annual Windows revenues from IBM would have dropped by $40 to $48 million, given IBM's volume of Windows shipments at that time. Norris, 6/7/99am, at 22:16-18. Norris testified that Microsoft offered to reduce the price IBM paid for Windows 95 if IBM, in Microsoft's words, agreed to "adopt Windows 95 as the standard operating system for IBM" and to make it "the only OS mentioned" in advertisements and marketing materials. Norris 6/7/99am, at 20:1 - 23:5 (quoting GX 2132). IBM did not agree to these provisions and others because they would have had the effect in the marketplace of effectively putting its own OS/2 operating system product "to the grave." Norris 6/9/99am, at 10:18-24.

vi. Kempin recognized that one tactic Microsoft could use to effectively decrease the cost to Windows would be to "Reduce some of the more rigid licensing requirements, which increase costs to the OEMs." GX 365.

49.3.2. Dean Schmalensee's analysis is also flawed because it leads to

absurd results.

i. Professor Fisher demonstrated that, at the price that would maximize Microsoft's short-run profits, given Dean Schmalensee's undisputed assumption that Microsoft's short-run marginal cost of

Windows equals zero, the elasticity of demand for Windows must equal one. Ct. Ex. 2-A; Ct. Ex. 2-B; Fisher, 1/12/99pm, at 13:16-16:19.

ii.   If Microsoft believes that it is operating at a point on the demand curve at which the elasticity of demand for Windows equals one, Microsoft must believe that a 10% increase in the price of Windows -- about $5 -- would lead to about a 10% decrease in the number of copies of Windows it sells. As Professor Fisher testified: "If you look at the testimony of the OEMs and you just think about it, that can't possibly be right. You can't believe that. It would believe it would lose 10% if it raised the price only $5, and the OEMs have no other place to go." Fisher, 1/12/99pm, at 16:16 - 17:8 (testifying about Microsoft's pricing).

49.4.   Fourth, even taken on its own terms, Dean Schmalensee's calculation of a "short term" monopoly price for Windows of more than $1,800 is wrong.

49.4.1.   Dean Schmalensee's calculation depends on his assumptions about three variables, all measured in the same year: (i) the average hardware price of a PC less the price of Windows; (ii) the elasticity of demand for PCs, and (iii) the average revenues Microsoft earns from sales of other complementary products (GX 1960). In each instance, Dean Schmalensee made arbitrary or flawed assumptions.

49.4.1.1.   Average price of a PC. Dean Schmalensee used $2,000 as the average price of a PC, even though that average was calculated by including higher-priced computers, such as workstations, and does not reflect the fact that, in setting its prices, Microsoft takes into account the downward trend in PC prices.

i.   Dean Schmalensee acknowledged that his $2,000 figure includes significantly more expensive servers and that "presumably" the right number to use would be one that includes only desktop PCs. Schmalensee, 6/24/99pm, at 71:23 - 73:9.

ii.   Professor Fisher testified that the $2000 figure Dean Schmalensee used in January for the average price of a PC (including Windows) significantly overstates today's true average price, whether or not that price properly includes monitors. Fisher, 6/4/99am, at 6:5-21; DX 2492 (citing $953 price).

iii.   The average price of PCs has clearly fallen in recent years and continues to fall. Fisher, 6/4/99am, 11:10 - 12:3. In February 1999, PC Data reported, sub-$600 PCs (not including monitor) were the fastest-growing retail segment and constituted 19.9% of all retail sales. DX 2493. Even the IDC study cited by Dean Schmalensee as the source for his estimate of average PC price shows PC prices falling historically and for the forseeable future. GX 2300; see also DX 2498, at 22. Dean Schmalensee acknowledged that it is appropriate to take the decline in hardware prices into account and lowered the average price of a PC in his formula from $2,000 in his January testimony to $1,800 in his June testimony. Schmalensee, 6/23/99am, at 14:11-17.

vi.   Contrary to Dean Schmalensee's $2,000 figure, Microsoft executives looked to the future expected price of the PC in setting the Windows royalty, and Joachim Kempin's December 1997 memorandum to Bill Gates discusses how Microsoft's pricing should take into account the growth of the sub-$1,000 PC market segment. GX 365.

49.4.1.2. Elasticity of demand for PCs. Dean Schmalensee

assumed that the elasticity of demand for PCs is 2 (Schmalensee, 1/21/99am, at 10:19-20;

Schmalensee, 6/24/99pm, at 62:17-19), but the reasons he gave for doing so are arbitrary and

unsound.

i.   Dean Schmalensee asserted that an elasticity of 2 followed from plaintiffs' assertion that PCs were a market (Schmalensee, 1/21/99am, at 10:5-7; Schmalensee, 1/20/99pm, at 39:1-3; Schmalensee, 1/20/99pm, at 40:22 - 23). But neither plaintiffs nor their experts took the position that PCs are a market. Neither Dr. Warren-Boulton nor Professor Fisher testified that there is a market

for operating systems for Intel-based PCs, and Professor Fisher made clear that conclusion does not require defining a market for personal computers. Fisher, 6/2/99pm, at 30:2-13; Fisher, 6/3/99pm, at 65:23 - 66:6.

ii.   Dean Schmalensee gave inconsistent testimony about his own views on the plausible range of elasticities.

(1)   In his October 1998 deposition, he testified that there is a plausible range one could think of, and that "'numbers below one are pretty implausible. Numbers above five and six are pretty implausible, based on elasticities one encountered, but that's a pretty wide range, economically, and I don't think I know enough to narrow it.'" Schmalensee, 6/24/99pm, at 63:16-20 (quoting Schmalensee's deposition).

(2)   In his trial testimony, Dean Schmalensee testified he had done no work since his deposition to estimate the price elasticity for PC systems and had seen no estimates in the literature. Schmalensee, 1/20/99pm, at 39:8-11.

(3)   Yet in his rebuttal direct testimony, when asked whether he had previously testified "that a range of up to 6 was plausible," he answered: "No, it isn't. I went back and looked at everything I've said in this proceeding on the subject, and I don't think that's consistent with what I said. . . . I never said 4 was plausible and I don't believe it." Schmalensee, 6/23/99am, at 18:16-24.

(4)   Dean Schmalensee sought to reconcile this inconsistent testimony by characterizing his deposition testimony as an "outlier" among his testimony on the topic. He contended that his January testimony was consistent with his current contention that an elasticity of four in this market is "totally implausible." Schmalensee, 6/24/99pm, 64:12-23; id. at 67:23 - 69:6.

iii.   Dean Schmalensee arbitrarily assumes an elasticity of demand for PCs of 2 despite having testified at his deposition that the elasticity could plausibly range up to five or six and despite having cited no studies of the PC industry by himself or others to justify his assumption. Schmalensee, 6/24/99pm, at 63:16 - 65:15.

49.4.1.3. <u>Complementary revenues</u>. Dean Schmalensee used an incorrectly low and arbitrarily-derived estimate of Microsoft's complementary revenues from Windows sales.

i.   Dean Schmalensee derived his estimate of complementary revenues by arbitrarily dividing the revenue of Microsoft's applications group (which he regarded as the repository of complementary revenues) by the revenue of Microsoft's platforms group (which he regarded as representing revenue from the sale of Windows), and then doubling that figure to reach what he called a "generous" estimate of approximately $100 in complementary revenues per copy of Windows. Schmalensee Dir. App. B, at B-4 n.11
                            ; Schmalensee, 1/21/99am, at 11:23 - 12:1 (characterizing this estimate as "generous"); Schmalensee, 1/21/99am, at 17:25 - 18:25 (explaining methodology).

ii.   Correcting for Dean Schmalensee's errors, Professor Fisher estimated Microsoft's true complementary revenues as $160, before any doubling for conservatism -- that is, more than three times Dean Schmalensee's estimate. Fisher, 6/1/99pm, at 15:16 - 17:5. And this is quite apart from Dean Schmalensee's failure to take full account of future complementary revenues because of his formula's limitation to the short-term. <u>See</u> <u>supra</u> ¶ 49.1.

49.4.2. Despite the conceptual defects in Dean Schmalensee's formula, as Professor Fisher testified, it is nonetheless possible using plausible estimates of each of the variables in the formula to estimate a short-term profit-maximizing price for Windows that is close to the price Microsoft actually charges.

i.   Professor Fisher testified that using an elasticity of demand for PCs of four (within the range that Dean Schmalensee testified is "plausible"), a current price per PC of $1,000, and a corrected complementary-revenues estimate of $160, Dean Schmalensee's equation shows that the price for Windows that would maximize Microsoft's profit is $65 -- very close to the actual price of Windows. Fisher, 6/1/99pm, 17:17 - 18:2. Using an elasticity of five -- also within Dean Schmalensee's range -- would produce, according to Dean Schmalensee's analysis, a profit-maximizing price of $40, which is in fact below the actual price of Windows. Fisher, 6/1/99pm, at 18:3-6; see also Fisher, 6/1/99pm, 11:8-23.

ii.   Professor Fisher further testified that performing the same exercise with the significantly higher price per PC that was typical in 1996 or 1997 still produces estimates, according to Dean Schmalensee's analysis, that are within a few hundred dollars of the actual price of Windows in 1996 or 1997. Fisher, 6/2/99am, at 31:13-21.

4.   Dean Schmalensee is wrong that Microsoft's other behavior is inconsistent with monopoly power

50. Dean Schmalenssee argued that Microsoft is not a monopolist because it does not

"behave like a firm with monopoly power" (Schmalensee Dir. ¶ 180 (emphasis omitted)), but his

analysis is flawed.

50.1. As an initial matter, Schmalensee's approach is flawed because it implicitly

but wrongly assumes that monopoly power means unlimited power and ignores the fact that a

monopolist has an incentive to increase its monopoly profits by improving product quality.

i.   Dr. Warren-Boulton testified that, "to an economist, every monopolist faces competition. Every monopolist faces potential entry. But the reason why he faces competition or potential competition is because profit-maximizing behavior is to raise your prices until you run into that competition. . . . So something is out there, whether it's entry, whether it's just simply demand falls off, or whatever reason, there is a reason why" a monopolist "doesn't increase the price further than he is already increasing it." Warren-Boulton, 11/19/98am, at 38:23 - 39:18.

ii.   Dr. Warren-Boulton also testified: "There's nothing about monopoly power that indicates that a profit-maximizing monopolist has some incentive not to listen to its customers." Warren-Boulton, 11/30/98am, at 29:22 - 30:11.

iii.   Professor Fisher testified that even a monopolist has incentive to increase demand for its product. Fisher, 1/12/99pm, at 19:1 - 20:15.

50.2. Microsoft's general efforts to innovate are thus consistent with monopoly

power, even if absent innovation Microsoft might eventually lose its monopoly power (see

Maritz Dir. ¶ 153).

i.   Professor Fisher testified that one "can't look at an industry or a market, and . . . from merely the fact that innovation is going on, conclude that there can't be monopoly power." Fisher, 1/12/99pm, at 19-20; 6/3/99am, at 8:11-14.

ii.   Dr. Warren-Boulton testified that "a company always has the option, if you like, of simply stopping technical innovation . . . I just don't understand why anyone would want to do that . . . there is nothing I conclude from that as to whether or not" Microsoft "is a monopoly or not. A monopolist also has the same incentive to innovate as a competitive firm." Warren-Boulton, 11/19/98am, at 79:12-25.

iii.   Dr. Warren-Boulton further explained: "if Microsoft were to simply . . . shut down its R&D version . . . it would probably lose its monopoly power within a reasonable time period," but that is entirely consistent with Microsoft's possession of monopoly power today. Warren-Boulton, 11/19/98pm, at 41:8 - 43:14.

50.3. Microsoft's efforts (amounting to several hundred millions of dollars a

year) to induce ISVs to write applications that run on Windows are also consistent with

monopoly power.

50.3.1. Inducing ISVs to write more and better applications makes

Microsoft's operating system more attractive, thus increasing the monopoly profits Microsoft can

earn.

i.   Paul Maritz testified that Microsoft's efforts to work with developers result in "great applications for Microsoft's Windows family of operating system products," which in turn increases Windows' attractiveness to consumers. Maritz Dir. ¶¶ 127, 136.

ii.   See supra ¶ 26.1.

50.3.2. Inducing ISVs to write more and better applications to Windows also increases the applications barrier to entry because it increases the attractiveness of the Windows platform, which reinforces ISVs' incentives to write first and foremost to Windows, and reduces the resources ISVs can devote to writing to other operating systems.

i.   Dr. Warren-Boulton testified that inducing ISVs to develop for Windows is "an investment in creating the applications barrier to entry." Warren-Boulton, 11/24/98am, at 39:13-14.

50.4. Microsoft's argument that the existing installed base of Windows users and piracy together prevent Microsoft from exercising monopoly power (Schmalensee, 1/14/99am, at 25:4-22; Maritz Dir. ¶ 123) is also flawed.

50.4.1. The evidence shows that, whatever constraint piracy imposes on Microsoft's pricing, it is not substantial and does not prevent Microsoft from enjoying monopoly power.

50.4.1.1. Microsoft discourages piracy by penalizing OEMs through MDAs for shipping naked machines.

i.   Dean Schmalensee testified that Microsoft's MDAs penalized OEMs for shipping naked machines, and that the purpose of the penalty is to reduce piracy.   Schmalensee, 6/23/99pm, at 67:13 - 70:17; 69:7 - 70:18.

ii.

50.4.1.2. There is no evidence that piracy prevents Microsoft from exercising substantial monopoly power. To the contrary, the evidence shows that Microsoft has substantial and durable discretion over its pricing of Windows notwithstanding the possibility of piracy.

      i.   See supra Part II.C., ¶¶ 33-38.

50.4.2. The evidence similarly shows that the modest constraint created by its installed base does not prevent Microsoft from enjoying monopoly power.

      i.   As Professor Fisher testified, Microsoft prohibits licensees from transferring operating systems to new computers; there is thus no "secondary market" in operating systems. Fisher Dir. ¶ 77.

      ii.   The installed base cannot affect the price of operating systems acquired in connection with OEM sales. "New operating systems are principally acquired in connection with the purchase of new computers and only secondarily in connection with upgrades. At best, Microsoft's installed-base argument relates to its pricing of upgrades. It does not apply to the more important channel of new computers." Fisher Dir. ¶ 75; Warren-Boulton, 11/19/98am, at 64:18 - 66:8 (testifying that consumers buying an operating system with a new PC and an "upgrade" operating system have different demand characteristics).

      iii.   And, as Dr. Warren-Boulton explained, the constraint on Microsoft's pricing of upgrades is modest because, although software "never wears out" (Maritz Dir. ¶ 202), it can become obsolete. Warren-Boulton, 11/19/98am, at 64:7-17. Indeed, as explained, Microsoft's pricing of its Windows 98 upgrade product

evidences substantial pricing discretion and thus monopoly power even in that market segment. <u>See</u> <u>supra</u> ¶ 36.