

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

STATE OF NEW YORK, et al	.	
	.	CA No. 98-1233(CKK)
Plaintiff,	.	
	.	Washington, D.C.
v.	.	April 10, 2002
	.	2:04 p.m.
MICROSOFT CORPORATION,	.	
	.	
Defendant.	.	Volume 15
.	

AFTERNOON SESSION
TRANSCRIPT OF TRIAL RECORD
BEFORE THE HONORABLE COLLEEN KOLLAR-KOTELLY
UNITED STATES DISTRICT JUDGE

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Scott L. Wallace, RDR, CRR
Official Court Reporter

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1 P R O C E E D I N G S

2 THE COURT: All right, good afternoon, everyone.

3 THE COURTROOM: Good afternoon, Your Honor.

4 THE COURT: We're proceeding with Dr. Appel and

5 Mr. Holley continuing with cross.

6 MR. HOLLEY: Yes, Your Honor.

7 CONTINUED CROSS-EXAMINATION OF ANDREW APPEL

8 BY MR. HOLLEY:

9 Q. Dr. Appel, could you turn, sir, to paragraph 26 of your

10 written testimony which appears on page 10.

11 A. Yes.

12 Q. Now, you say there in the first sentence, sir, that "an

13 operating system is software that manages and controls a

14 computer's hardware and provides a platform on which

15 application programs or middleware can run."

16 And do you continue to agree with that assertion,

17 sir?

18 A. Yes, an operating system does that.

19 Q. And if Microsoft's obligation under Section 1 of the

20 non-Settling States' proposed remedy is to ensure that

21 after Microsoft middleware products are removed, the

22 operating system continues to perform effectively and

23 without degradation, how can it continue to serve the

24 function of a platform for applications if things that

25 applications rely on are no longer there?

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1 A. It's my recollection that there's a parenthetical that

2 says, "except for the functionality that has been removed."

3 Precisely it says, "without degradation, other than the

4 elimination of the functionalities of any removed Microsoft

5 middleware products."

6 Q. But to the extent that you believe that the purpose of

7 an operating system, one purpose of an operating system is

8 to serve as a platform for applications, you would agree

9 with me, would you not, sir, that that function is impaired

10 to the extent that Microsoft middleware products that are

11 relied on by some of the 70,000 Windows applications are

12 removed from the system and no longer available?

13 A. Yes, in the sense that some of the functionality will

14 be gone.

15 Q. Now, you believe that under Section 1, after it comes

16 into effect, OEMs like Compaq and Dell can choose which

17 Microsoft middleware products they want to remove from the

18 operating system; is that right?

19 A. That's right.

20 Q. And you also believe that third-party software

21 developers might decide that whereas their applications

22 today run on every brand of personal computer that's

23 running Windows XP, in the future under Section 1, those

24 applications might only run, for example, on the Compaq

25 version of Windows XP because that is the only version of

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1 the operating system that exposes all of the functionality

2 that the software application developer -- that the

3 software developer's application needs to run?

4 A. You're saying that if Compaq is the only OEM not to

5 remove a Microsoft middleware, and that the other OEMs who

6 remove that Microsoft middleware don't put in some

7 non-Microsoft middleware substitute so that only the Compaq

8 version of the operating system has this particular API

9 support in it?

10 Q. Yes, that's my hypothetical.

11 A. Then there could be some applications that would run

12 only on the Compaq configuration of the unbound operating

13 system.

14 Q. And as a result, some software developers might decide

15 that whereas now they get all PCs running Windows XP, in

16 the future created by Section 1, they might target only

17 Compaq PCs; is that right?

18 A. Well, what they could do to make their software run on

19 other PCs is to ship Microsoft middleware with their

20 applications, which of course they would need Microsoft's

21 permission to do under license.

22 Q. And if they did so, their products would become both --

23 both more complex and larger, as a result?

24 A. Well, I know when I purchased Microsoft Office, it

25 ships with a copy of the Internet Explorer middleware, just

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1 in case the version of Internet Explorer on whatever
 2 version of the Microsoft operating system I have previously
 3 installed is the wrong one. That is, there has been many
 4 versions of Microsoft Internet Explorer over the years.
 5 Microsoft would like Office to run and it uses Internet
 6 Explorer, the current version of Internet Explorer, as part
 7 of its platform. So when I buy Office for my PC, and the
 8 Office I buy today for my PC might run on the Windows 98
 9 operating system or the Windows XP operating system, and
 10 Microsoft isn't sure which version of Explorer I have
 11 installed, so Microsoft packages Internet Explorer
 12 middleware on the same disk with its application and
 13 middleware programs in Microsoft Office.
 14 I'm buying Office, but Microsoft has packaged
 15 Explorer with it just in case I don't have the right
 16 version of Explorer on my computer. And if I do have the
 17 right version, then the packaged copy of Explorer won't
 18 bother to install itself.
 19 Q. Can you answer the question I asked you, Dr. Appel,
 20 which is: Would that make those third-party developers'
 21 products larger and more complex, yes or no?
 22 A. It would mean that distribution in the case of
 23 distribution on a CD-Rom would be bigger, and the
 24 distribution in the case of over-the-network downloading
 25 would be bigger, in the case that a copy of the middleware

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1 also had to be bundled with it.
 2 Q. You do not know, do you, Dr. Appel, whether Windows
 3 components that fall within the definition of Microsoft
 4 middleware products in the non-Settling States' proposed
 5 remedy that need to be optionally removable under the
 6 definition x(i) may nonetheless be removed by OEMs and
 7 third-party licensees in another manner than the manner
 8 provided by Microsoft?
 9 A. Well, I do know that -- are you asking me whether there
 10 are technical means of removing the middlewares from the
 11 operating system product?
 12 Q. Well, don't you believe that one possible
 13 interpretation of the non-Settling States' proposed remedy
 14 is that Section 1 requires Microsoft to provide a technical
 15 mechanism for OEMs and third-party licensees to remove
 16 components that fall within the definition of Microsoft
 17 middleware products and that Section 2.c. little Roman iv
 18 permits those OEMs and third-party licensees to remove
 19 components from Windows by technical means other than those
 20 that Microsoft has provided under Section 1?
 21 A. Well, first of all, Section 1 requires that the
 22 Microsoft middleware products may be readily removed, and
 23 by "readily" I take that to mean whatever technical means
 24 are available to the OEMs must not be unduly difficult,
 25 okay.

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1 In Section 2, 2.c.(iv), at the very end of the
 2 paragraph where it says that "Microsoft may not prohibit,"
 3 I guess by license, the OEMs from removing the code from
 4 Microsoft middleware products, I interpret that to mean
 5 that the OEM could remove a Microsoft middleware product,
 6 not just any arbitrary piece of Microsoft middleware, but a
 7 Microsoft middleware product from the operating system.
 8 Q. Well, take a look, if you would, sir, at your
 9 deposition, the second volume of page 289 starting at line
 10 17, and tell me when you're there.
 11 A. What page did you say?
 12 Q. 289.
 13 A. Yes.
 14 Q. Now, do you recall being asked the question: "And if
 15 there is, does Section 2.c. little Roman iv give OEMs and
 16 third-party licensees the right to remove those Microsoft
 17 middleware products even though they are outside the scope
 18 of the unbound version?"
 19 "Answer: I don't know. It's possible that the
 20 answer is yes, and in that interpretation, Provision 1
 21 requires that in the first iteration that Microsoft provide
 22 certain technical means that OEMs can use to remove
 23 Microsoft middleware products. And one interpretation of
 24 Section 2.c. little Roman iv might be that OEMs are
 25 permitted to remove the code for Microsoft middleware

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1 products by technical means other than what Microsoft has
 2 provided by Provision 1. But I'm not sure."
 3 Do you remember being asked that question, sir, on
 4 March 13th, and giving that answer?
 5 A. Yes, I do.
 6 Q. You do not know, do you, sir, how many
 7 cross-dependencies there are between the component, the
 8 components in Windows XP Embedded that you associate with
 9 Internet Explorer and other parts of the operating system?
 10 A. No, I don't. I thought about how one might measure
 11 that, but it's not something that I've been able to do in
 12 the last two or three weeks.
 13 Q. Do you believe, Professor Appel, that a principle of
 14 modular programming, one principle of modular programming
 15 is that the interfaces exposed by a block of software code
 16 should be as small as possible relative to the
 17 implementation of functionality that lies behind those
 18 interfaces?
 19 A. Yes.
 20 Q. And one benefit of having small interfaces is that they
 21 permit software developers to alter the way in which the
 22 functionality exposed by those interfaces is implemented
 23 within a block of software code without affecting the
 24 external interfaces of the code, correct?
 25 A. Yes, that's one reason, for example, why the States'

<p style="text-align: right;">Page 3155</p> <p>1 remedy limits itself to only a certain set of APIs that 2 need to be exposed and doesn't try to interfere with 3 Microsoft's discretion with arranging its internal APIs. 4 Q. And even if blocks of software code are designed in 5 accordance with this principle of modular programming, 6 changing software code within one module can have 7 unforeseen effects in other modules? 8 A. Yes, that's true. 9 Q. If a third party like Novell has a block of software 10 code that it wants to use as a substitute for something 11 that falls within the definition of a Microsoft middleware 12 product, and the lines that define that block of software 13 code do not correspond with the modules within the Windows 14 operating system, is Microsoft required under Section 1 to 15 recraft its code so that the Novell block fits precisely 16 into Windows? 17 A. No. The -- it's not the case that any arbitrary 18 fragment of Microsoft middleware must be removable under 19 Remedy Provision 1; it's that an entire Microsoft 20 middleware product may be removable. The boundaries of 21 what is an entire Microsoft middleware product is not 22 really at the discretion of Novell. 23 Q. So, Microsoft gets to decide what constitutes a 24 Microsoft middleware product? And I know this is a 25 simplification, but let's -- tell me if you can't accept</p>	<p style="text-align: right;">Page 3157</p> <p>1 upon to support a particular function and you didn't 2 replace it with a functional equivalent, then other 3 functions of the calculator which also relied on that same 4 shared code would be disabled? 5 A. That's right. 6 Q. I take it from your testimony yesterday that you have 7 formed a conclusion based on your review that you've been 8 able to do to date of Windows XP Embedded that Microsoft's 9 operating system is modular? 10 A. Yes, I would say it's built in a modular way. 11 Q. And that modularity does not preclude the existence of 12 cross-dependencies among modules such that if I pull one 13 module out, other parts of the operating system 14 malfunction? 15 A. Yes, it's normal in modular programming that one 16 modular software program may rely upon another module for 17 functionality. And so if you remove one module upon which 18 another module has relied, then that other module won't be 19 able to obtain that functionality. 20 Q. And although there is not a precise mathematical 21 relationship, you agree that as a general proposition, the 22 more modules there are in a complex product like Windows, 23 the more likely it is that there will be cross-dependencies 24 among those modules such that pulling one module out will 25 cause other modules in the operating system to malfunction?</p>
<p style="text-align: right;">Page 3156</p> <p>1 it, but if the block of software code that Microsoft makes 2 optionally removable is square, and the Novell replacement 3 is hexagonal, such that it won't fit in the operating 4 system, that's not Microsoft's problem under Section 1 as 5 you understand it? 6 A. Yeah, let me rephrase your question. If Microsoft 7 makes blocks of middleware code removable at the boundaries 8 of the Microsoft middleware products in compliance with 9 this judgment -- and the definition of Microsoft middleware 10 product gives some guidance about what those boundaries 11 are -- then if Novell wants to fit in a block of code that 12 doesn't precisely match those boundaries in such a way that 13 it won't fit, then that's not Microsoft's problem. 14 Q. Now, you're familiar with Professor Bennett at the 15 University of Colorado's example in his expert report in 16 this case of a five-function calculator that uses the same 17 shared software code to perform five different functions, 18 addition, subtraction, multiplication, division, and square 19 roots, correct? 20 A. Yes, I read his expert report. 21 Q. And you believe that that example is reasonable as a 22 matter of software engineering, do you not? 23 A. As a way to build a program, a calculator, yes. 24 Q. And you also agree that if you removed some of the 25 software code from this calculator example that was relied</p>	<p style="text-align: right;">Page 3158</p> <p>1 A. I'm not sure I would put it that way, that -- as a 2 matter of software engineering, I encourage my students to 3 divide a large piece of software into many small modules, 4 and then to take those small modules and group them into 5 bigger modules and so on, that having more modules is not 6 necessarily something to be avoided. 7 Q. No, I wasn't suggesting that, sir, but take a look at 8 your deposition at page 173 in the first volume starting at 9 line 14. 10 Do you remember being asked: "And in fact, the 11 greater the number of modules, the more likely it is that 12 there will be such cross-dependencies, correct?" 13 "Answer: I would hate to make a quantitative 14 judgment of that form, but yes, with more modules there is 15 at least more potential for dependency between modules." 16 Do you remember being asked that question and 17 giving that answer, sir? 18 A. Yes, I do. And yes, it's true, with more modules there 19 is at least more potential for dependencies between 20 modules. 21 Q. Now, turn with me, if you would, sir, in the 22 non-Settling States' proposed remedy to the definition of 23 middleware which appears in paragraph 22.x.(i) and that -- 24 I'm sorry, Microsoft Middleware Product, 22.x.(i) on page 25 23, and tell me when you're there, sir.</p>

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1 So, this is not a list of particular pieces of code
2 in the Windows operating systems; it is instead a list of
3 categories; is that correct?
4 A. Yes, it does appear to be a list of categories, so I
5 would imagine, for example, that an e-mail client software
6 product would be a Microsoft middleware product.
7 Q. And as to Windows XP Professional and Windows XP Home,
8 there are at least two things that would fall within the
9 category of Internet browsers, correct, both Internet
10 Explorer and MSN Explorer?
11 A. All right.
12 Q. Well, do you agree with that? I don't want to --
13 A. I think so. I'm not exactly sure what the difference
14 between Internet Explorer and MSN Explorer is.
15 Q. Okay. How many different Microsoft middleware products
16 in Windows XP Professional fall within the category media
17 creation, delivery and playback software.
18 A. I'm not sure. There is the Microsoft -- the Windows
19 Media Player, which I believe falls in the category of
20 delivery and playback software. I'm not sure what products
21 Microsoft sells in media creation. I guess -- I'm not
22 really an expert on the different product categories of
23 Microsoft software.
24 Q. There are two features of Windows for people who have
25 visual disabilities, one called Windows Magnifier and the

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1 other one called Windows Narrator. Are they in your view
2 media creation delivery and playback software as that
3 category is described in Paragraph 22.x.(i)?
4 A. I'm not sure.
5 Q. Let's look at the category of software in 22.x.(i)
6 entitled "Management Software" -- "Directory Services, and
7 Management Software." Is the Disk Cleanup Wizard in the
8 accessories folder of Windows XP, management software as
9 that term is used in 22.x.(i)?
10 A. Direct -- you mean under "Directory Services and
11 Management Software"?
12 Q. "Directory Services and Management Software," yes.
13 A. No, I don't believe it is.
14 Q. Okay. And what do you think is encompassed in Windows
15 XP Professional within the category "Directory Services and
16 Management Software"?
17 A. Directory services and management software is software
18 that manages directories in the sense of a certain special
19 kind of database that attributes -- that attributes names
20 of people to their roles in an organization, names of
21 people to which kinds of access privileges they have to
22 different parts of the network, names of machines to, you
23 know, to which people they belong to and where they sit and
24 how they relate to each other.
25 I believe that Microsoft has a product called

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1 Active Directory that does that, but I'm not familiar in
2 great detail with directory services in general or with
3 Microsoft's products in that area.
4 Q. Is the Disk Cleanup Wizard in Windows XP Professional
5 systems and enterprise management software as that term is
6 used in paragraph 22.x.(i)?
7 A. No, I don't think so. I don't think systems
8 specifically refers to computer systems. Enterprise
9 management software, enterprise is, for example, a
10 corporation or a non-profit organization, and so, I believe
11 the software is related to that kind of interoperation
12 between the members of an enterprise. The disk cleanup is
13 related to a specific piece of hardware and so on.
14 Q. The term "directories" in 22.x.(i) is an imprecise term
15 in computer science which could include a large number of
16 different Windows components, correct?
17 A. It's my understanding that the use of the term
18 "directories" in 22.x.(i) is consistent and largely
19 overlapping with the term "directory services and
20 management software."
21 Q. And that is an understanding that you developed as the
22 States' technical expert by calling Carl Ledbetter of
23 Novell and asking him what the term meant in this decree;
24 is that correct?
25 A. Yes, I did have a discussion with him among other

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1 people in bettering my understanding of directory services
2 and management software.
3 Q. And that is because the word "directory" has many
4 different meanings in computer science, and you have no
5 expertise in the field of industrial computer science
6 practice that would be sufficient for you to feel
7 comfortable providing a list of what is and is not meant by
8 the word "directories" under Section 22.x.(i)?
9 A. I am aware of different definitions of the word
10 "directories" in computer science. And the use of
11 directories specifically related to directory services and
12 management software is one that I don't have an extremely
13 great depth of technical expertise in. There are many
14 different kinds of middleware, and I am more expert about
15 some kinds than about others.
16 Q. Well, you agreed with me at your deposition that the
17 Windows registry in Windows XP could be a directory under
18 22.x.(i), didn't you?
19 A. It may have some functionality in common with what
20 directory services and management software does.
21 Q. And if we got the proverbial computer scientist from
22 Mars to come to the courtroom, he would tell us that a
23 directory in computer science refers to any list of files
24 in a folder, right?
25 A. That's one of the meanings, list of files,

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1 approximately. That's one of the meanings of the word
 2 "directory" in computer science. It's not the meaning of
 3 the word.
 4 Q. Right. And the reason that you asked the lawyers at
 5 Williams & Connolly and Dr. Ledbetter of Novell what
 6 directory meant in 22.x.(i) is from reading this
 7 definition, you had no idea, right?
 8 A. I wasn't sure which of the different meanings of the
 9 word "directories" in computer science was meant here.
 10 Q. Now, one of the things that's listed as middleware in
 11 Paragraph 22.w. on page 22, so it's the previous page to
 12 the one we were just looking at, is a network operating
 13 system. Do you see that, sir? Actually the definition
 14 begins on 22 and the words "network operating systems"
 15 appear on 23.
 16 A. Yes, I see that.
 17 Q. And it isn't entirely clear to you what that means
 18 because you don't expect to port one operating system to
 19 run on another operating system, correct?
 20 A. Yes, I think that network operating systems don't
 21 support applications and make them more portable by
 22 providing APIs. They make applications more portable by
 23 providing communications interfaces. To the extent -- and
 24 so most of the kinds of middleware -- many of the kinds of
 25 middleware listed here do provide the function of

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1 middleware in making applications easier to port by
 2 providing APIs, and so I had been thinking in that mode.
 3 But some of these kinds of middleware render
 4 applications more portable by providing communications
 5 interfaces. To the extent that the application gets some
 6 of its services across the network through communications
 7 interface, that means it doesn't have to get those services
 8 from the operating system on the desktop machine, and that
 9 means that it's easier to port that application to a
 10 different operating system on the desktop machine.
 11 Q. You think, Professor Appel, that it would be useful to
 12 have a definition of the term "network operating system" in
 13 paragraph 22.w. because it isn't entirely clear to you what
 14 that term means in this context; isn't that correct?
 15 A. I think I have an understanding of that term.
 16 Q. Well, take a look at your deposition, sir, on page 95.
 17 THE COURT: First or second one?
 18 MR. HOLLEY: I'm sorry, Your Honor, in the first --
 19 they are actually sequentially paginated, and 95 appears in
 20 the first of the two volumes.
 21 BY MR. HOLLEY:
 22 Q. Well, actually, why don't you look first, Professor
 23 Appel, at page 94 starting at line 9 where I asked you:
 24 "Well, where is the term 'network operating system' defined
 25 in the States' proposed final judgment?"

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1 And your answer was: "It's not."
 2 A. Yes.
 3 Q. And then -- are you there with me, sir?
 4 A. I'm there.
 5 Q. And then I asked you starting on line 13 of the next
 6 page: "Is that true in the case of Solaris, for example,
 7 there is a distinction between the version of Solaris that
 8 is used to manage a domain and the version of Solaris that
 9 runs on any given server in the domain?"
 10 And you answered: "Each machine in a domain
 11 probably runs the same version of Solaris, but I think
 12 we're referring here to the network management
 13 functionality, and it could well be that it would be useful
 14 to have an explicit definition of this term, 'network
 15 operating system,' in the remedy."
 16 Do you remember giving that testimony, sir?
 17 A. Yes, I do.
 18 Q. Now, Microsoft Office is a suite of business
 19 productivity applications, correct?
 20 A. Yes, although it also serves as middleware for other
 21 applications.
 22 Q. And you are aware that the Court of Appeals in this
 23 case did not hold that Microsoft Office was middleware?
 24 A. I'm not sure of that. And it also may be the case that
 25 in the year 2001 or 2002, that Office is serving more and

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1 more as a middleware platform for other applications.
 2 Q. Well, Professor Appel, take a look, sir, if you will,
 3 at page 124 in volume 1 of your deposition starting at line
 4 19.
 5 Do you remember being asked, sir: "Did the Court
 6 of Appeals say that Microsoft Office was middleware as it
 7 used that term?"
 8 "Answer: I don't believe the Court ruled that
 9 Microsoft Office is middleware."
 10 Do you remember being asked that question and
 11 giving that answer?
 12 A. I think I did give that answer, yes.
 13 Q. You do not know, do you, sir, whether the version of
 14 Microsoft Office for the Macintosh exposes the same APIs to
 15 software developers as are exposed by Microsoft Office for
 16 Windows?
 17 A. That's right.
 18 Q. And you believe that if Microsoft Office for the
 19 Macintosh does not expose APIs to software developers, then
 20 it -- it would not be middleware as the Court of Appeals in
 21 this circuit understands that term?
 22 A. That's right. If any particular version of Microsoft
 23 Office does not expose any APIs as a platform for software
 24 developers, then it's not middleware.
 25 Q. And you believe that any Microsoft application that

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1 uses something called Visual Basic for applications to
2 permit its functionality to be accessed by other software
3 products would be a Microsoft middleware product under the
4 non-Settling States' definition?
5 A. Yes, Visual Basic is one way of programming
6 applications, and if a Microsoft software product provides
7 APIs that those applications can use as a platform for
8 getting services, then it is middleware.
9 Q. And you do not know, sir, how many of the hundreds of
10 software products marketed by the Microsoft Corporation
11 would thereby be converted into Microsoft middleware
12 products under the non-Settling States' decree?
13 A. No, I don't.
14 Q. I'm sorry, was that a no?
15 A. What was the question? How many of the Microsoft --
16 Q. Yes. My question was: Do you know as you sit here
17 today how many of the Microsoft software products would be
18 converted into Microsoft middleware products by virtue of
19 the fact that their functionality is exposed to software
20 developers through the use of Visual Basic for
21 applications?
22 A. "Converted" is a funny term. I don't know how many
23 should be considered as middleware because they expose APIs
24 for Visual Basic programming.
25 Q. I'm happy to accept that amendment. And the answer is

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1 you don't know how many, sir?
2 A. I don't know.
3 Q. Now, let's turn to Section 4 of the non-Settling
4 States' proposed remedy. You believe, do you not,
5 Professor Appel, that one purpose of Section 4.A. is to
6 permit other companies to create functional substitutes for
7 Microsoft platform software?
8 A. Yes, that's right.
9 Q. And that Microsoft platform software would include
10 Microsoft Office, correct?
11 A. Yes.
12 Q. And it would also include all Windows operating systems
13 from Windows CE through all of the desktop versions of
14 Windows up through Windows NT 4.0 Server, Windows 2000
15 Server, Windows 2000 Advanced Server, and Windows 2000
16 Datacenter Server; is that correct?
17 A. Assuming that all of those fall under the definition of
18 Microsoft platform software, which I believe is the case.
19 Q. Now, did the Court of Appeals in this case hold that
20 Microsoft has monopoly power in server operating systems?
21 A. I'm not sure.
22 Q. And did the Court of Appeals in this case hold that
23 Microsoft has monopoly power in operating system for non-PC
24 devices?
25 MR. HODGES: Objection to the extent he's being

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1 asked to testify about what the Court of Appeals held.
2 MR. HOLLEY: Your Honor, I'm just asking for his
3 understanding having read the opinions, whether he thought
4 that the Court of Appeals held that Microsoft had monopoly
5 power in operating systems like Windows CE.
6 THE COURT: It does seem to me that for somebody
7 who's an expert, he can indicate if that's his
8 understanding or not. That's the basis that informs part
9 of his decision. He's already indicated that, you know,
10 he's knowledgeable of the Court of Appeals opinion, and
11 he's answered earlier questions.
12 If he can't, then fine, he'll say so, but I think
13 as an expert, if he's reviewed it, he can indicate whether
14 this is, in his view -- I don't have to be bound by it --
15 but in his view if it fits into what the Court of Appeals
16 has stated or not, so I'll allow it.
17 BY MR. HOLLEY:
18 Q. Professor Appel, do you have the question in mind or --
19 A. Yes, I believe the Court of Appeals did not hold that
20 Microsoft has a monopoly in hand-held devices -- in
21 operating systems for hand-held devices.
22 Q. You believe, do you not, sir, that Section 4.A. would
23 require Microsoft to provide competitors like the IBM
24 Corporation and Sun Microsystems with the information that
25 they need to create functional equivalents to all of

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1 Microsoft's operating systems?
2 A. Well, some of the information that they need: The
3 information about how to interoperate with those same
4 applications that now or in the future might interoperate
5 with Microsoft Windows.
6 Q. Well, take a look, if you would, sir, at page 130 of
7 your deposition transcript which appears in the first
8 volume starting at line 25:
9 A. Page 130?
10 Q. 130, and I think just for context, it might be easier
11 to start at line 13. Do you remember being asked the
12 question: "And what other purpose do you have in mind that
13 you would like" --
14 A. I'm sorry, what page?
15 Q. I'm sorry, 130, line 13.
16 A. Okay.
17 Q. You were asked the question: "And what other purpose
18 do you have in mind that you would like to be covered by
19 the disclosure requirements?
20 "Answer: The purpose of providing a functional
21 substitute for Microsoft products.
22 "Question: And which Microsoft products are
23 encompassed by the notion that ISVs should be able to
24 create functional substitutes under the States' proposed
25 final judgment?

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1 "Answer: Microsoft platform software generally,
2 which includes the Microsoft Windows operating system
3 product and Microsoft middleware products.
4 "Question: Does that extend to permitting third
5 parties to create functional replacements for Windows 2000
6 Server?
7 "Answer: Yes."
8 Do you recall being asked those questions and
9 giving those answers?
10 A. Yes, and in the last case I said yes because the
11 Windows 2000 Server operating system, I believe, is
12 substantially the same operating system as the Windows 2000
13 desktop operating system.
14 Q. Now, you believe that the functional replacements that
15 IBM and Novell and Sun should be able to create for
16 Microsoft operating systems should be such exact replicas
17 of Microsoft's products that they are capable of
18 substituting for Microsoft's products in existing computer
19 networks such that no changes need to be made when that
20 substitution occurs?
21 A. Well, I don't think I would use the term "replica,"
22 because that carries the connotation of just copying
23 Microsoft's source code, for example. And I certainly
24 don't believe that they should be able to do that.
25 They need to know what are the functional

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1 specifications of interoperation, how it is that these
2 applications want to talk to the platform software so that
3 they can talk to the applications in the same way. But
4 when the application talks to them in that way and says,
5 "Do this for me," they have to figure out on their own how
6 to do that.
7 Q. Well -- I'm sorry, I didn't mean to cut you off.
8 A. Go ahead.
9 Q. Look at your deposition, page 140. It again begins on
10 line 25, first volume.
11 "Question: Does it mean that the information
12 disclosures have to be sufficiently broad to create plug
13 replacements for Microsoft products?
14 "Answer: The disclosures regarding interfaces and
15 communications protocols do have to be broad enough for
16 that."
17 Do you remember being asked that question and
18 giving that answer, sir?
19 A. Yes.
20 Q. Now, one of the things that Section 4.A. is intended to
21 permit Microsoft's competitors to do is to create an
22 alternative to Windows for running 32-bit Windows
23 applications?
24 A. Yes.
25 Q. And Section 4.A. would require Microsoft to provide a

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1 precise specification of what functionality is provided to
2 third-party applications by each and every API exposed by
3 Windows operating systems, correct?
4 A. Exposed by Windows operating systems in such a way that
5 Microsoft middleware or Microsoft applications use them for
6 that interoperation.
7 Q. And that applies to each and every one of the APIs
8 exposed by Windows, correct?
9 A. Yes, each API that's exposed by Windows and is actually
10 used by a Microsoft application or Microsoft middleware
11 product.
12 Q. And even if Microsoft already documents the APIs
13 exposed by Windows sufficiently to allow those APIs to be
14 called upon by third-party applications, Section 4 requires
15 Microsoft to go further than that and to provide sufficient
16 information to permit other companies to replicate the
17 functional aspects of the Microsoft operating system?
18 A. Yeah. In some cases, more documentation may need to be
19 provided so that the -- so that other developers can speak
20 the same language as the interfaces, yes, in the APIs and
21 communication interfaces.
22 Q. So even if we -- if I'm correct, as we're standing here
23 today, there is sufficient information available in the
24 world to permit the authors of those 70,000 Windows
25 applications that Judge Jackson found to have written them,

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1 that disclosure is not sufficient under Section 1 of the
2 non-Settling States' proposed remedy unless it also permits
3 other companies to replicate the functional aspects of
4 Microsoft operating systems?
5 A. Well, again, I'm not sure I would use the word
6 "replicate."
7 Q. Well, you have, haven't you, sir? Have you used that
8 word in the past in regard to Section 1?
9 A. I'm not sure.
10 Q. Well, take a look at your deposition, page 71.
11 A. Yes.
12 Q. I said, at line 12: "Question: What, if anything,
13 prevents either Ximian --" and Ximian is the company that
14 is seeking to create an open source version of the .NET
15 framework, is that right, just for context?
16 A. That's right.
17 Q. "What if anything prevents either Ximian or anyone else
18 from writing their own data access code to run on top of
19 the common language infrastructure?
20 "Answer: If the APIs are not fully and clearly
21 documented, or if they're only documented from the point of
22 view of the client of these APIs --" and by that you mean
23 someone calling them to get functionality, right?
24 A. That's right.
25 Q. "-- then such implementers may face the same kinds of

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1 problems that implementers have faced in trying to
2 replicate the functional aspects of the Microsoft operating
3 system itself. The APIs are inadequately documented
4 for --" it says "for," but perhaps it meant "from", "--
5 documented for the point of view of providing that
6 functionality."
7 Do you remember giving that answer, sir?
8 A. Yes.
9 Q. And what you're talking about here is disclosures that
10 are sufficient to permit Microsoft's competitors to, in
11 your words, replicate Microsoft's products?
12 A. Right, to provide the same kind of functionality. The
13 disclosure should say what functionality is provided by the
14 platform software; the disclosures do not need to explain
15 how Microsoft achieved that functionality.
16 Q. If Microsoft did something innovative in the way its
17 operating system provides services to applications running
18 on top of Windows, the disclosure obligation of Section
19 4.A. would require Microsoft to hand those innovations over
20 to its competitors on a royalty-free basis under your view,
21 correct?
22 A. If the innovations had to do directly with the
23 interface, the connection between the application and the
24 operating system, then that would be necessary. That means
25 that a non-Microsoft platform software would not be able to

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1 interoperate at all with the applications for Microsoft's
2 platform software.
3 If the innovations occurred inside a software
4 module in a way not directly connected with the interface,
5 and the majority of the software code in any large system
6 is in the internals, such innovations don't have to be
7 disclosed under the provisions of the States' remedy.
8 Q. Now, we talked a little bit earlier today about which
9 interfaces have to be disclosed under Section 4.A. of the
10 States' remedy. You believe that the only interfaces that
11 are immune from this disclosure obligation are those that
12 are naturally completely internal to the operating system
13 kernel, correct?
14 A. No, I don't think that's true. I gave that as one
15 class of such interfaces that are naturally immune.
16 Q. Well, take a look, if you would, sir, at page 81 of
17 your deposition, the first volume, starting at line 7, and
18 tell me when you're there, please.
19 Do you remember being asked the question: "Okay,
20 in how granular a way does the States' proposed final
21 judgment seek to permit people to write replacements for
22 the operating system block numbered 6?" And this is a
23 reference to a diagram in your expert witness report, which
24 you recall, correct?
25 A. Yes.

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1 Q. And the answer that you gave was: "That at the
2 granularity, let's say, of the entire operating system
3 kernel, that interfaces that are naturally completely
4 internal to an operating system kernel need not be exposed,
5 so that replacements need not be enabled at a granularity
6 layer smaller than the operating system kernel."
7 By which you meant to say that everything outside
8 the kernel would have to be replaceable, correct, sir?
9 A. No. What I meant to say is that everything inside the
10 kernel would not have to be replaceable. What I said was
11 that interfaces internal to the operating system kernel
12 need not be exposed. That's not at all the same thing as
13 saying other interfaces all need to be exposed.
14 Q. Now, when you used the word "kernel" here in your
15 deposition answer, in light of our conversation this
16 morning, would you now choose to amend this answer to say
17 that it is interfaces that are naturally completely
18 internal to the core operating system?
19 A. If an interface is internal to the core operating
20 system in the sense that it's not called upon by Microsoft
21 middleware products or by applications, then it need not be
22 disclosed under the terms of the States' remedy. That's
23 what I would mean by internal to the Windows core operating
24 system.
25 Q. Well, we have the problem that we talked about before

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1 lunch, right, where we have to -- Microsoft would have to
2 disclose all of the APIs that are relied upon by each
3 Microsoft application to interoperate with Microsoft
4 platform software, and under one plausible interpretation
5 of that, we're talking about the interfaces between
6 anything that might be viewed as an application level
7 program within Windows?
8 A. I think before the break I explained that -- I don't
9 believe that any library fragment that you might be able to
10 incorporate into an application is the same as a Microsoft
11 application. So I really don't think that's a reasonable
12 interpretation of Microsoft application.
13 Q. Well, is DirectX a Microsoft application under this --
14 under the plausible reading of 4.A.1. that you and I have
15 been discussing?
16 A. I'm not actually very familiar with DirectX.
17 Q. Well, if it's the multimedia subsystem in Windows, is
18 it big enough to be an application?
19 A. I would imagine that if it's a multimedia subsystem, it
20 probably exposes APIs as a platform for development.
21 Q. Does that make it middleware?
22 A. So that would make it middleware. I'm not sure that it
23 would be a natural thing to port, so it may or may not
24 satisfy that definition of middleware, but it might, so
25 DirectX might well be middleware.

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1 Now, I'm not sure that it also satisfies the
2 definition of Microsoft middleware product because, as I
3 said, I'm not very familiar with what DirectX is.
4 Q. If it provides some of the same functionality as Apple
5 QuickTime for Windows, it would be a Microsoft middleware
6 product, correct, under x.(ii)?
7 A. Yes, probably, unless it's part of some larger
8 Microsoft middleware product, but it might well be a
9 Microsoft middleware product.
10 Q. You agree that there are reasons why Microsoft --
11 legitimate reasons why Microsoft does not want to disclose
12 internal interfaces within blocks of software code that
13 make up the Windows operating system?
14 A. Yes, that's right. The disclosure of purely internal
15 interfaces might not be a good idea for certain technical
16 reasons.
17 Q. And one technical reason that would provide a
18 legitimate basis for not wanting to disclose an internal
19 interface is that you might short-circuit certain check
20 routines, privileged checking routines that are important
21 to maintain the stability of the operating system?
22 A. Yes, in some cases that's right.
23 Q. And another reason why you might not want to disclose
24 internal interfaces within blocks of software code is that
25 doing so prevents you from rearranging the code inside

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1 those blocks to increase performance or stability or
2 scalability or some other feature over time?
3 A. That's right.
4 Q. And you agree that it is possible that there are
5 internal interfaces within blocks of software code defined
6 as Microsoft middleware products that do not have error
7 handling routines that they would need to have if those
8 interfaces were to be called upon by third-party
9 applications or middleware?
10 A. So you're talking about an internal interface inside a
11 Microsoft middleware product that is not directly called
12 upon from any other Microsoft middleware product or from
13 any other software component outside that Microsoft
14 middleware product?
15 Q. That is my --
16 A. That would be an internal interface.
17 Q. Yes. And you agree with me that such interfaces may
18 not currently have error handling routines that they would
19 need to have if they were to be called upon by third-party
20 applications or middleware?
21 A. That's right.
22 Q. Now, when you testified about your second scenario for
23 compliance with Section 1 this morning where the APIs --
24 where functionality that was part of a Microsoft middleware
25 product gets moved into the core of the operating system

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1 and no longer exposes APIs to applications, does that
2 conflict with Microsoft's obligation to expose all APIs to
3 developers under Section 4.A.?
4 A. If it's moved into the core of the operating system for
5 use by the core of the operating system so that no -- so
6 that the API that exposes internally to the core of the
7 operating system is not called upon by any Microsoft
8 middleware product or by any Microsoft application, then it
9 is not considered as middleware and Microsoft can make that
10 rearrangement. It would be considered a purely internal
11 API.
12 Q. Now when you say it cannot be called upon by any
13 Microsoft application, what sort of applications are we now
14 talking about, Word and Excel or the help system of the
15 operating system or both?
16 A. I think we're talking about Word and Excel.
17 Q. But it would be all right in your view under Section 1
18 to move functionality relied on by the Windows help system
19 into the core of the operating system, as long as whatever
20 that functionality is was not exposed through APIs to
21 third-party software developers?
22 A. That's right.
23 Q. Now, under 4.C. of the States' proposed remedy,
24 software developers are in certain circumstances entitled
25 to look at the source code of Microsoft operating systems,

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1 correct?
2 A. That's right.
3 Q. And what if they, in looking at the source code,
4 discovered, lo and behold, there is all this wonderful
5 functionality in the operating system that isn't exposed to
6 them through published APIs? Can they then start hacking
7 into that code?
8 A. As a technical matter? As a technical matter --
9 Q. As a technical matter, first of all.
10 A. In some cases, it's possible as a technical matter, and
11 in other cases it's not possible as a technical matter,
12 yes.
13 Q. Would they be entitled to do that under Section 4?
14 A. Well, under Section 4.C., I believe that Microsoft is
15 permitted to impose terms, some sort of license or
16 nondisclosure agreement that the third party -- that the
17 application developers who visit this secured facility
18 would be required to comply with. And it might be
19 reasonable to impose the terms that they not use this for
20 the purpose of interoperating at any internal Microsoft
21 API, by the definition of internal that we've been using,
22 i.e., not used by some other Microsoft middleware product
23 or application. So that would be perhaps one way to handle
24 this scenario.
25 Q. You think that would be permissible under Section 4.C.?

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1 A. Yes, I think so.
2 Q. Now, one of the things that Section 4 requires
3 Microsoft to do, if you look at the embedded definition of
4 technical information, which I call your attention to.
5 It's Paragraph 22.nn. on page 25.
6 A. All right.
7 Q. One of the things Microsoft has to do in providing
8 technical information is to provide a reference
9 implementation for its operating systems, correct?
10 A. Well, for each API and communications interface,
11 Microsoft is required to provide adequate technical
12 information, and in particular under 4.A., Microsoft is
13 required to provide all APIs, technical information, and
14 communications interfaces that Microsoft employs to enable
15 each Microsoft middleware product to interoperate with
16 Microsoft platform software.
17 So what does that mean that Microsoft employes to
18 enable? Presumably Microsoft documents for the use of its
19 own middleware developers what are the APIs to other parts
20 of the platform software. And in connection with such
21 documentation, it not only lists what the names of the APIs
22 are, it explains how to use them. And there are many ways
23 of explaining how to use an API, and the definition of
24 technical information lists some of the different ways that
25 could be used for a particular API. I imagine that there

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1 is no API for which every one of these kinds of technical
2 information would be useful.
3 And the limiting thing in Section 4.A. is the
4 technical information that Microsoft employs to enable each
5 Microsoft middleware product to interoperate. So if
6 Microsoft provides a particular kind of technical
7 information to its own developers who have to interoperate
8 across that boundary, then it should provide it to
9 non-Microsoft developers who have to interoperate across
10 that boundary.
11 Q. Well, if you look at the definition of "Technical
12 Information" in nn, it says in the second sentence,
13 "Technical information includes but is not limited to
14 reference implementations," and then a long series of other
15 things.
16 Is it your interpretation that despite the presence
17 of the words "includes but is not limited to," that in some
18 instances the technical information required to be
19 disclosed does not include a reference implementation?
20 A. That's right. If Microsoft or a particular API does
21 not employ a referencing implementation to enable Microsoft
22 middleware products to interoperate with Microsoft platform
23 software or the other kinds of interoperation listed in
24 Sections 1 and 3 of 4.A., then Microsoft is not required to
25 provide a reference implementation in that case.

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1 The purpose of each kind of technical information
2 is to adequately document the means of using the API. And
3 sometimes a reference implementation is very useful for
4 that purpose. A reference implementation is an example of
5 what the implementation might be doing, and it's a detailed
6 technical example of an exemplary way of achieving a
7 certain kind of functionality; it's not the particular
8 software source code that is used to achieve that way.
9 Q. And in many instances outside of academia where people
10 are really building products to sell, there is no reference
11 implementation other than the shipping product, right?
12 A. That's right. There are many APIs where it's not
13 necessary to use a reference implementation to adequately
14 document the purpose of the API, so in those cases, there
15 won't be one.
16 Q. And it's your understanding under Section 4.A. that
17 Microsoft is not obligated to create reference
18 implementations that do not exist?
19 A. I think that's right. I think -- I think that if
20 they -- the more they adequately document their APIs, the
21 less there will be people visiting the secured facility to
22 try to understand how to interoperate, and Microsoft might
23 choose to provide better technical descriptions of its APIs
24 to lessen the burden of having visitors to its secured
25 facility, and all the kinds of technical information in

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1 that definition are examples of how Microsoft can do that.
2 Q. Now, going back to Section 4.A. and putting aside for
3 the moment national security concerns and concerns about
4 export control, you believe that if the People's Republic
5 of China has a minister whose job it is to clone Windows,
6 he is a person entitled to disclosures under Section 4.A.?
7 A. Can you explain what --
8 MR. HODGES: Objection to the form of the question.
9 It's overly limited. You can't set aside U.S. law and then
10 ask if a representative of another company can come in and
11 pirate the information.
12 THE COURT: If that's correct, then why don't you
13 reformulate it.
14 BY MR. HOLLEY:
15 Q. Could a minister of the People's Republic of China
16 charged in the national interest of his country with
17 cloning Windows view all of the technical information that
18 Microsoft would be required to disclose under Section 4.A.?
19 A. Well, I'm not sure what you mean by cloning Windows.
20 Do you mean to create a functional substitute for?
21 Q. That's a very good definition.
22 A. Okay. Yes, I believe that Microsoft must broadly
23 disclose the interoperability information in Section 4.A.,
24 and that people in China will generally be able to read it
25 probably on the Microsoft Web site or in whatever means

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1 Microsoft chooses to disclose it, as they already read
 2 similar kinds of information that Microsoft has already
 3 disclosed in order to enable the application developers to
 4 interoperate with the Microsoft platform software.
 5 Q. If Microsoft invited ten leading software developers to
 6 review the early specification of a brand-new operating
 7 system that was still on the drawing board in Redmond to
 8 find out whether those software developers thought that
 9 Microsoft was building a product that they wanted and
 10 needed, you don't know whether that disclosure would
 11 trigger an obligation under Section 4.A. to provide that
 12 same information to the entire world?
 13 A. Are you saying that these ten people are
 14 representatives of ISVs?
 15 Q. Yes, sir.
 16 A. So, I think you're asking me about the definition of
 17 "timely manner" referred to in definition -- in Section
 18 4.A..
 19 Q. That could bear on your answer, sir, yes. And if you
 20 want to look at it, the definition is pp on page 25 of the
 21 non-Settling States' proposed remedy.
 22 A. And are you saying that this discussion with the ten
 23 representatives of ISVs takes place earlier than the time
 24 that this information is disclosed to Microsoft's
 25 application developers?

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1 Q. Yes. Hasn't been disclosed to anyone but the people
 2 within the Microsoft operating system development group who
 3 are drafting a specification for a brand-new operating
 4 system.
 5 A. And is it the case that these ten people would be under
 6 some sort of nondisclosure obligation to require them not
 7 to use this information immediately in building
 8 applications? Are they reviewing it for the purpose of
 9 commenting on it or for the purpose of getting a head start
 10 developing products?
 11 Q. For the purpose of commenting on it.
 12 A. And they are under a nondisclosure obligation not to
 13 disclose it further?
 14 Q. Well, they will be but for this decree. Let's assume
 15 that --
 16 A. Okay. Then, I think that the only term in the
 17 definition of "timely manner" that might be implicated
 18 here, of course, is Roman numeral III, "disclosed to any
 19 third party," and I think that in that case, one reasonably
 20 might not count this as a form of disclosure. If these are
 21 people employed as consultants to the point that they are
 22 under a very strict nondisclosure, then I think that they
 23 almost don't count as a third party, but at this point, you
 24 know, it may be beyond my technical expertise as a computer
 25 scientist to talk about this kind of business relationship.

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1 Q. The view that you just expressed, I take it, is newly
 2 formed over the last six weeks?
 3 A. Well, you did ask me about this question at my
 4 deposition, and I guess I've had a chance to reflect on it
 5 since then. I don't think I devoted a great deal of
 6 thought to it in the meantime.
 7 Q. Okay. And if these people are not consultants to the
 8 Microsoft Corporation but rather employees of Lotus and
 9 Novell and Borland and Corel, does that alter your
 10 analysis?
 11 A. I think if they're under such strict nondisclosure that
 12 they can't even disclose it to other employees of Novell
 13 and Corel and so on, then they are, in fact, acting as
 14 consultants to Microsoft, but again, this may be beyond my
 15 expertise as a computer scientist to judge this kind of
 16 business relationship.
 17 Q. Under Section 4.C., which has to do with access to
 18 Microsoft source code, if I am a 16-year-old living in
 19 Tuscaloosa, Alabama, developing software in my garage, I
 20 have a right to come to Microsoft's headquarters in
 21 Redmond, Washington, under Section 4.C., and look at the
 22 source code for Microsoft operating systems?
 23 A. Not necessarily. I think that -- let me turn back to
 24 4.C.. 4.C. has the term "reasonable access"; licensees,
 25 third-party licensees and so on shall be permitted

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1 reasonable access to study, and in the explanatory
 2 rationale that the States have provided, it's not in this
 3 copy of the proposed judgment, they give an example of
 4 reasonable access. The example they give is if a certain
 5 person has a history of software piracy, Microsoft might
 6 deny access.
 7 But presumably that's not the only example.
 8 Examples are meant to show that Microsoft has some
 9 discretion in good faith, to in good faith deny access, and
 10 that discretion might even, probably does even extend to
 11 asking the applicant for access which part of the API is
 12 unclear that they wish to interoperate with, and so on.
 13 So, I think that in general, one should broadly
 14 disclose APIs and so on to a wide range of software
 15 developers. There are many software developers in this
 16 country who, you know, don't have the benefit of academic
 17 credentials or a bachelor's degree or whatever, who are
 18 nonetheless innovative and important software developers,
 19 and they all had to get their start somewhere. And so they
 20 need to be able to interoperate with other software in the
 21 world just as much as anyone else.
 22 But I still think that Microsoft has some
 23 discretion under the words -- under the terms "reasonable
 24 access," to make this judgment if they do so in good faith.
 25 Q. There is nothing in Section 4.C. that says that a third

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1 party viewing the source code can't take notes while
2 they're doing so, is there?
3 A. I don't see anything about not taking notes.
4 Q. And is there anything in Section 4.C. that says that a
5 third party with a good memory can't look at clever
6 algorithms that Microsoft has created to perform particular
7 functions and then use those algorithms in the other
8 party's code?
9 A. It doesn't say that here. To some extent, algorithms
10 can, of course, be patented, and in that case, the
11 developer couldn't use the algorithm.
12 Q. Well, presumably that wouldn't matter, would it, under
13 Section 15 of the States' remedy because Microsoft would
14 have to give that person a royalty-free license to all of
15 its patents.
16 A. Only if the patents are implicated in the communication
17 across the API; if the patent is on some technique that's
18 internal to how a function is performed, not which function
19 is performed or how to talk about that function, then it's
20 internal, and that kind of patent need not be licensed
21 under the terms of the States' remedy.
22 Q. And if the algorithm wasn't patented, a skilled
23 software developer wouldn't have to memorize all 38 million
24 lines of code in the source code for Windows XP in order to
25 glean useful information from reviewing that source code?

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1 A. Well, I guess I have in the past looked at source code
2 under nondisclosure agreements which prohibit me from using
3 trade secrets that I may have learned from looking at the
4 source code. So, to the extent that those trade secrets
5 are about the interface in the same way as we just
6 described -- that I just described with patents, Microsoft
7 may have to disclose or license those trade secrets. But I
8 think that Microsoft could impose terms in its reasonable
9 access agreement about the appropriation of trade secrets.
10 Q. How many thousands of people per month would be
11 entitled to come to Redmond to look at the source code for
12 all of Microsoft's operating systems under Section 4.C.?
13 A. I don't know. I think it would depend on whether the
14 disclosures made in 4.A. are better or worse. If the
15 disclosures made under 4.A. are technically adequate to
16 interoperate, then software developers can rely upon those
17 disclosures.
18 And to learn how to interoperate with a piece of
19 software by reading the source code for that software is
20 very time consuming and therefore expensive. So software
21 developers naturally prefer to have digested descriptions
22 of how to interoperate as called for in 4.A., and to the
23 extent that Microsoft can do that well, then there will be
24 much less need for people to visit the secured facility
25 under 4.C..

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1 Q. Now, one of the things that 4.C. says is that somebody
2 can come study the source code at Microsoft in order to
3 interoperate, and that's a capitalized defined term,
4 correct?
5 A. Yes.
6 Q. And the definition of "interoperate" -- maybe we should
7 look at that. That's paragraph 22.Q. on page 22, so
8 Section 22.Q., page 22.
9 It says that: "Two products must be able to
10 support the full features and functionality of one
11 another." And that's just one way of saying that the two
12 products must be functional substitutes for one another,
13 correct?
14 A. No, not at all. It means that if one product can do
15 six different things, let's say there's a Microsoft product
16 software, maybe it's on a different -- maybe it's through a
17 communications interface or API, it can do six different
18 things, and another product whose purpose is different, for
19 example, which is connected to it, can ask it to do those
20 six different things.
21 Now, if the other product that it's connected to is
22 only told how to ask it to do four different things, then
23 it's not accessing the full functionality of the other and
24 it's not able to utilize the full features and
25 functionality of the other.

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1 And if the other product, you know, maybe the one
2 that can do 12 things, isn't able to communicate -- I guess
3 I'm getting too confusing here.
4 So that's the point of access, utilize, and
5 support: It's being able to use the interface, the API or
6 the communications interface to talk about and request the
7 different functionalities that may be available.
8 Q. Well, this is a pretty short definition. It says:
9 "Interoperate means the ability of two products to
10 effectively access, utilize, and/or support the full
11 features and functionality of one another."
12 Where are you deriving this number of or this
13 definition? I mean, do you see that in the words here,
14 sir?
15 A. Yeah, I'm giving an example. I'm talking about
16 features, for example, the ability of a piece of software
17 to do six different things. That's maybe six different
18 features, all right? And if you only disclose to me the
19 words to ask for four of those features and you don't tell
20 me what words to use to ask for the other two features,
21 then you're not permitting me to interoperate according to
22 the States' definition. There may be some partial
23 interoperation. I can access or utilization some of your
24 features, but not the full features, not all of the
25 features.

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1 Q. Let's pretend that you're computer A and I'm computer
2 B --
3 A. All right.
4 Q. -- and we're going to interoperate, and you speak
5 Sanskrit, English, and German, and I speak English and
6 French.
7 A. All right.
8 Q. Now, the fact that I don't speak one of the languages
9 that you speak denies us the ability to fully interoperate
10 under this definition, does it not?
11 A. I guess if you speak English and French, you should
12 disclose how to speak English and French, right, if I
13 wished to interoperate with you, and the idea is that --
14 let's turn to the use of the word "interoperate" back in --
15 Now I lost track of where we are. Which provision of the
16 remedy are we at?
17 Q. We're back in 4.C..
18 A. All right. Right. If you speak English and French,
19 and you know how to do six different things, presumably six
20 different things unrelated to speaking languages, and I
21 were to teach you German, you would still only know how to
22 do those six different things, right?
23 The full features referenced here isn't about how
24 to ask for things, it's what things you know how to do, and
25 so a non-Microsoft developer who wants to make a software

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1 product that interoperates with the Microsoft software
2 product needs to know how to ask for all the things that
3 the Microsoft software product knows how to do and is
4 willing to do when another Microsoft product speaks to it.
5 That's what's meant by interoperate here, and I
6 think that this definition captures that in a reasonable
7 and concise way.
8 Q. In forming your view, have you reviewed any of the
9 submissions made by Novell, Sun Microsystems, or the IBM
10 Corporation in a proceeding in Brussels in front of the
11 European Commission which centers on the word
12 "interoperate?"
13 A. No, I have not.
14 Q. You do not know, do you, whether the .NET framework
15 makes any calls to interfaces of Windows that are not
16 documented in MSDN?
17 A. That's right.
18 Q. And you do not know whether there are APIs exposed by
19 the .NET framework that have not been documented for use by
20 software developers?
21 A. That's right. The .NET framework is a relatively new
22 thing, and I actually have studied parts of it in fair
23 depth, but I don't know about the internals of the
24 Microsoft implementation of it, so I don't know whether
25 it -- whether the Microsoft implementation -- how it calls

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1 upon the underlying Microsoft platform software. And
2 again, since I haven't studied the Microsoft implementation
3 of that framework, I don't know what it might expose to
4 software developers that are different from what's
5 documented. I've read the documentation.
6 Q. You are familiar with the common language
7 infrastructure because there are other implementations than
8 Microsoft's in existence, correct?
9 A. There are other implementations than Microsoft being
10 worked on. I don't think that they're at all complete, so
11 in partial existence, yes.
12 Q. And don't tell me which ones you're aware of, but as
13 far you know, the people that you are aware of that are
14 working on those implementations are continuing to do so?
15 A. That's right.
16 THE COURT: If this is a good place to stop, we
17 can -- we can take our afternoon break.
18 MR. HOLLEY: Yes, Your Honor. Thank you.
19 THE COURT: All right, we'll take a 15-minute
20 break. So we should be back at quarter of, and we'll
21 resume at that time.
22 (Thereupon, a break was had from 3:32 to 3:58 p.m.)
23 THE COURT: All right, good afternoon again.
24 MR. HOLLEY: Good afternoon, Your Honor.
25 THE COURT: Let's proceed.

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1 BY MR. HOLLEY:
2 Q. Professor Appel, the third provision of the
3 non-Settling States' remedy that you were opining about is
4 number 16; is that correct?
5 A. That's right.
6 Q. And in paragraph 143 of your written direct testimony
7 which appears on pages 54 and 55, tell me when you're
8 there, sir.
9 A. Yes.
10 Q. One of the things you say on the carry-over part of the
11 paragraph on page 55 in the first complete sentence is that
12 "Microsoft can and has subverted reliance on industry
13 standards by not abiding by those standards." Is that your
14 testimony, sir?
15 A. Yes.
16 Q. Now, when I asked you at your deposition about
17 manipulation and pollution of industry standards by
18 Microsoft, you told me that what you were relying on was
19 Microsoft's Visual J++ development tools that in your
20 understanding misled developers into writing Windows
21 specific Java applications, correct?
22 A. I believe I may have said that, yes.
23 Q. And you agree that the Court of Appeals in this case
24 said that it was perfectly all right for Microsoft to
25 develop a Java run-time environment that did not conform to

<p style="text-align: right;">Page 3199</p> <p>1 Sun's specifications? 2 A. That's right. 3 Q. And you also agree, do you not, sir, that if software 4 developers using Visual J++ did not use Microsoft's key 5 words and compiler directives, they could use Visual J++ to 6 write Java applications that could be run on other Java 7 run-time environments? 8 A. I think key words and compiler directives were one part 9 of the problem, and the other part may have been 10 non-standard class libraries. 11 Q. But you do agree, sir, that if developers used 12 Microsoft's Visual J++ tools and did not use the key words 13 and compiler directives that call directly to Windows, they 14 could write portable code in Java? 15 A. Yes, it is possible; it was possible to use the Visual 16 J++ in a mode where one could with care develop portable 17 applications. 18 Q. And software developers did not have to use Visual J++ 19 at all because there were products from Symantec, Borland, 20 and other suppliers that they could use to write Java 21 applications that could run on Microsoft's Java virtual 22 machine, correct? 23 A. That's right. I believe the issue was more that 24 Microsoft advertised Visual J++ as a Java compliant or Java 25 standard and so therefore, as a way to develop portable</p>	<p style="text-align: right;">Page 3201</p> <p>1 A. That is right. 2 Q. Now, as to HTML extensions, you are aware, are you not, 3 sir, that both Microsoft and Netscape extended HTML in ways 4 that permitted the creation of Web pages that could not be 5 properly displayed in the other Web browsing software? 6 A. That's right. 7 Q. And you do not know to what extent Microsoft submitted 8 its extensions of HTML to industry standards bodies like 9 the Internet Engineering Task Force or the Worldwide Web 10 Consortium? 11 A. That's right. 12 Q. With regard to Java as an industry standard, you agree 13 with me, do you not, sir, that many aspects of Java are 14 defined by Sun Microsystems? 15 A. Yes. 16 Q. And you also agree with me, sir, that Sun Microsystems 17 controls the test suites used to determine whether a 18 particular implementation of a Java run-time environment is 19 compliant with a Java specification? 20 A. I'm not sure that that's the case, but I would have no 21 information that would contradict that. 22 Q. Well, look at your deposition, sir, volume 1, page 188, 23 line 10. Do you remember, Professor Appel, being asked the 24 question: "Sun controls the tests that determine whether a 25 particular implementation is compliant with Java, correct?"</p>
<p style="text-align: right;">Page 3200</p> <p>1 applications. 2 Q. Now, with regard to the authorization data field in the 3 Kerberos specification, you agree that Microsoft's use of 4 that, what's sometimes referred to as off data field in its 5 Kerberos tickets, did not prevent the interoperation of 6 Microsoft's implementation of Kerberos with other 7 implementations of Kerberos with regard to authentication 8 as opposed to authorization? 9 A. That's right. The features of -- the standard features 10 of Kerberos, the Microsoft and non-Microsoft servers and 11 clients, all of the standard features of Kerberos, the 12 Microsoft version of that standard supported for 13 interoperation. It was when a non-Microsoft operating 14 system wished to access some of the additional features 15 that Microsoft's own operating systems supported that 16 Microsoft did not disclose the communications protocol 17 information necessary for full interoperation. 18 Q. And you agree with me, do you not, Professor Appel that 19 authentication is the principal subject of the Kerberos 20 protocol? 21 A. I believe that may be the case, yes. 22 Q. You are not aware, are you, sir, of any software 23 developer in the world who was misled into using the 24 authorization data field in Microsoft Kerberos tickets when 25 they did not want to do so?</p>	<p style="text-align: right;">Page 3202</p> <p>1 "Answer: I believe that's right." 2 Do you remember being asked that question and 3 giving that answer? 4 A. Yes, clearly I wasn't quite sure then either. 5 Q. CIFS stands for the Common Internet File System, 6 correct? 7 A. I'm not actually sure what CIFS stands for. 8 Q. SMB stands for server message block? 9 A. SMB I have, you know, used a lot, but more as an 10 acronym than remembering what it stands for. I understand 11 it's SAMBA. 12 Q. And SAMBA, S-A-M-B-A, is an open source product that 13 implements the SMB protocol on non-Microsoft server 14 operating systems, correct? 15 A. That's right. 16 Q. And you, yourself, sir, have used SAMBA for many years, 17 have you not? 18 A. Yes, I have. 19 Q. The computer science department at Princeton University 20 uses SAMBA to enable Windows client computers to access 21 files that are stored on non-Microsoft server operating 22 systems, correct? 23 A. That's right. 24 Q. And you yourself, sir, use SAMBA currently to access 25 files from your Windows 2000 Professional client on</p>

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1 non-Microsoft servers?
2 A. That's right; basic file access works fine.
3 Q. Now one of the provisions of the SRPFJ that you opine
4 on in your written testimony is Section Roman III.J.1.,
5 correct?
6 A. III.J.1.
7 Q. That's what's commonly referred to as the security
8 carve-out?
9 A. Yes.
10 Q. Would it be helpful to you, Professor Appel, to have a
11 copy of the SRPFJ up there with you? I think you may have
12 one, sir, but I'm happy to give you another one.
13 A. I'm not sure if it's here, and it would be helpful.
14 MR. HOLLEY: May I approach the witness, Your
15 Honor?
16 THE COURT: Yes.
17 THE WITNESS: Thank you.
18 BY MR. HOLLEY:
19 Q. And my question just is, is one of the provisions of
20 the SRPFJ that you address in your written direct testimony
21 Section III.J.1?
22 A. Yes, it is.
23 Q. Now, you are aware, are you not, sir, of computer
24 scientists in this country who believe that the less
25 information potential hackers have about the manner in

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1 which security is provided by an operating system, the less
2 likely those hackers will be able to break those security
3 mechanisms?
4 A. I certainly read a statement like that in the expert
5 report of Dr. Bennett, and he is a computer scientist.
6 Q. You are unaware, sir, of any instance in which
7 Microsoft has failed to disclose the information that other
8 software products need to process security keys generated
9 by Windows operating systems?
10 A. I believe there has been testimony about Microsoft's
11 nondisclosure to RealNetworks of information needed with
12 respect to the secure audio path. I'm not sure
13 specifically with whether that's with respect to keys, but
14 it was about interoperation and an API where there were --
15 where Microsoft claimed there were security-related issues.
16 Indeed the secure audio path does have some
17 security-related issues.
18 Q. Okay. But my question, sir, was related specifically
19 to keys. You -- as you sit here today, you're unaware of
20 any instance in which Microsoft has failed to disclose the
21 information that other software products need to process
22 security keys generated by Windows operating systems?
23 A. Um, I'm not sure. In some sense, the off data field is
24 related to information need to do process security keys,
25 but I'm not aware of large numbers of such instances in any

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1 case.
2 Q. Your testimony is that the privilege access
3 certificates in Microsoft's Kerberos tickets are security
4 keys?
5 A. Yes, in the sense that keys and tokens and tickets have
6 similar kinds of functionalities with respect to APIs.
7 Q. Professor Appel, there is nothing that prevents any
8 other company, in addition to Microsoft, from creating its
9 own digital rights management software, correct?
10 A. That's right, there are different companies that are
11 creating digital rights management software.
12 Q. So, there are already multiple kinds of digital rights
13 management software available in the world?
14 A. Yes.
15 Q. Now, you are aware that a hacker, an anonymous hacker,
16 has reverse-engineered the digital rights management
17 software in Windows XP, are you not?
18 A. Yes.
19 Q. And we discussed at your deposition that document,
20 which is an article which describes in considerable
21 technical detail how the digital rights management software
22 in Windows XP works, correct?
23 A. That's right.
24 Q. And by using the information contained in that article,
25 as well as the source code that is referenced in a

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1 hyperlink in that article, someone could steal copyrighted
2 content belonging to media companies like Sony and
3 Bertlesmann and Vivendi by defeating the digital rights
4 management software in Windows XP, correct?
5 A. That's right. My point in using that example is not
6 that defeating security is a good thing; it's that security
7 is not preserved by hiding APIs. In this case, Microsoft
8 did not disclose those APIs, and yet the hacker was able to
9 find out that kind of information without the Microsoft
10 disclosure.
11 Q. The publication of the source code referenced in that
12 document violates a fall law called the Digital Millennium
13 Copyright Act, correct?
14 A. The source code is not contained in the document. It's
15 linked by the document.
16 Q. But --
17 A. And there are certainly interpretations of that act
18 upheld in court that, under which the publication of that
19 source code violates the Digital Millennium Copyright Act.
20 Q. Including litigation in which you, yourself, have
21 participated in; is that correct?
22 A. I served as a witness in that litigation.
23 Q. And you submitted a declaration in one of those cases
24 where you argued that the Digital Millennium Copyright Act
25 was an unconstitutional violation of the First Amendment to

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1 the United States Constitution, correct?
2 A. That's right. I think that restriction on the
3 publication of explanations like that is a violation of the
4 First Amendment. That's my personal belief.
5 MR. HOLLEY: I have no further questions, Your
6 Honor.
7 THE COURT: All right. Redirect. I'll give you a
8 few moments to set up
9 REDIRECT EXAMINATION OF ANDREW APPEL
10 BY MR. HODGES:
11 Q. Professor Appel, you were asked yesterday, if you
12 recall, whether you had given any thought to how Microsoft
13 could comply with Section 1 of the States' proposed remedy
14 which requires Microsoft to create unbound versions --
15 THE COURT: You need to have your voice higher.
16 BY MR. HODGES:
17 Q. -- which requires Microsoft to create unbound versions
18 of its operating system products. Do you recall that
19 testimony?
20 A. Yes, I do. I think there are several ways that --
21 several technical options that Microsoft has available to
22 it at its discretion in complying with Remedy 1. Now, of
23 course, in the case where the different Microsoft
24 middleware products don't really depend on each other for
25 functionality, then it's very easy to make them removable.

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1 In the case where there is some dependence, then
2 one of the options Microsoft has, and I've explained this
3 so I won't go into great detail, is just let the Microsoft
4 middleware product be removable and OEMs might substitute a
5 non-Microsoft middleware to support that purpose, and in
6 any case, even if they don't, Microsoft is not responsible
7 for the removed functionality.
8 THE COURT: There wasn't a question, you simply
9 directed him to the area. So, perhaps you need to -- on
10 redirect, he's going to direct you to an area and then he's
11 going to ask you a question which is what you should wait
12 for.
13 So do you want to pick up on your question?
14 BY MR. HODGES:
15 Q. When you were asked the question yesterday about
16 whether you had given any thoughts to how Microsoft could
17 comply with Section 1 of the States' proposed remedy, did
18 you ever finish your answer to that question?
19 A. No, I didn't. I explained one or two of those ways,
20 but I don't think I explained all of them.
21 Q. Could you explain what ways in your opinion Microsoft
22 could comply with Section 1 of the States' proposed remedy?
23 A. One way is to simply let the Microsoft middleware
24 product be removable. Another way is to let subcomponents
25 of the Microsoft middleware products be removable. The

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1 States' remedy doesn't require that, but it permits that.
2 And then in the case of, for example, MS HTML, the
3 rendering engine the subcomponent of the browser, an OEM
4 might choose to leave that component in even if they want
5 to substitute a different browser, and then there's no
6 chance of degradation of the functionality of other
7 components that depend on that HTML rendering.
8 Another option, as I have explained, is to take
9 necessary fragments of functionality and embed them in
10 other products, other than Microsoft middleware products,
11 so they don't expose APIs.
12 Another kind of way to comply is just to reduce the
13 inherent commingling, or I should say interdependence
14 between the Microsoft middleware products. This would be
15 not really a mechanical engineering task; one requiring
16 some design to make the Microsoft middleware products a
17 little less dependent on each other, and Microsoft might
18 choose to do this, for example, if it doesn't like the
19 other options because it doesn't want to be dependent for
20 functionality on a non-Microsoft substitute.
21 And finally, because I think that this provision
22 doesn't overly specify how Microsoft is to perform this
23 technical job, there might be other technical avenues that
24 Microsoft can use that I haven't even thought of.
25 Q. So, did I count four different options?

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1 A. I think I listed four.
2 Q. Would Microsoft have to employ any particular one of
3 those options that you just announced?
4 A. It could use any one of those options or it could use
5 the different options in different combinations; it could
6 employ different options to the different middleware
7 products; it could think of its own technical means of
8 complying that are not among my list.
9 Q. How many unbound versions of the Windows operating
10 system product would Microsoft have to create under Section
11 1 of the States' proposed remedy?
12 A. For each operating -- for each bound operating system
13 that it distributes, such as Windows XP, or maybe even such
14 as Windows XP Home and Windows XP Professional, it would
15 have to also distribute an unbound version, except of
16 course for Windows 98 and 98SE where it has no obligation,
17 and except for Windows 95, which is an unbound operating
18 system.
19 So for each bound operating system, one unbound
20 operating system.
21 Q. Does Microsoft currently distribute Windows 95?
22 A. I don't know that it does.
23 Q. How long could Microsoft continue to distribute each of
24 the unbound versions that it creates?
25 A. If Microsoft makes an unbound version of Windows XP,

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1 then it has satisfied its obligation with respect to
 2 Provision 1, and it could continue to distribute that
 3 unbound version and the bound version of Windows XP for as
 4 long as its likes.
 5 Q. Is there anything in Section 1 of the States' remedy in
 6 your opinion that would require Microsoft to stop
 7 distributing either the bound or the unbound version of,
 8 say, Windows XP on some particular date?
 9 A. I think the second paragraph of Provision 1 says, "With
 10 respect to the unbound Windows operating system product."
 11 And what I understand that to mean is that for a particular
 12 bound Windows operating system product, there is one
 13 unbound Windows operating system product, that's why we can
 14 say, "With respect to the unbound Windows operating system
 15 product." So I don't think it's the case that for Windows
 16 XP, for example, there would be one unbound version of
 17 Windows XP now and one later.
 18 Q. If within six months Microsoft could create an unbound
 19 version of Windows XP that complied with Section 1, would
 20 it have to either take it off the market or create some
 21 other version of Windows XP in six months under the second
 22 paragraph of Section 1?
 23 A. If within six months Windows -- Microsoft produces an
 24 unbound version of Windows XP that complies with the second
 25 paragraph, that is, that it permits the removal only of the

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1 middleware products identified in definition x.(i), then I
 2 believe it has discharged its obligation with respect to
 3 the Windows XP operating system.
 4 Q. You provided some testified on a product called Windows
 5 XP Embedded. Do you recall that testimony?
 6 A. Yes, I do.
 7 Q. Have you had a chance to examine Windows XP Embedded?
 8 A. Yes, I have. I used this -- the -- well, Windows XP
 9 Embedded comes in two parts, really. One is the source
 10 code which is the same as the source code for Microsoft
 11 Windows XP, because it's really the same operating system,
 12 and a target designer tool, and so I have used the target
 13 designer tool to experiment with different configurations
 14 of the Windows XP operating system.
 15 Q. Perhaps we could back up to a higher level, and if you
 16 could just explain what Windows XP Embedded is?
 17 A. Well, Windows XP Embedded is a Windows XP operating
 18 system that Microsoft markets for OEMs to use for embedded
 19 applications. An embedded application is one that, unlike
 20 desktop, sits in the device that the end-user may not even
 21 realize has a computer in it, for example, a set-top box on
 22 top of a television to do cable TV or a video game console,
 23 or, I guess, a toaster.
 24 And for that type of application, Microsoft wants
 25 to provide its Windows XP operating system but realizes

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1 that the OEM may not need all the functionality of the
 2 Windows XP operating system to run a set-top box or a video
 3 game console. So they provide the same operating system
 4 files as in Windows XP, but they also provide a tool that
 5 the OEM can use to select which of those files they want to
 6 use if they are building a set-top box instead of a desktop
 7 operating system.
 8 Q. What do you mean it has the same files as Windows XP?
 9 A. Well, the Microsoft documentation accompanying Windows
 10 XP says it has the same binary files -- I think it even
 11 says 100 percent the same binary files as Windows XP.
 12 Now, a binary file is the software code of the
 13 operating system, and so, if it has 100 percent the same
 14 binary files, the same software code, then I take it to be
 15 the same operating system.
 16 Q. When you say that the licensee of Windows XP Embedded
 17 could remove components, does that include removing a
 18 Microsoft middleware product?
 19 A. Oh, yes. For a set-top box, you won't need many of the
 20 Microsoft middleware products; you won't even need the
 21 Windows desktop. The kinds of things that can be removed
 22 include not only Microsoft middleware products, but lots of
 23 individual fragments.
 24 Q. Can Windows XP Embedded run on a personal computer?
 25 A. Technically it can. The license agreement that

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1 Microsoft provides to OEMs with Windows XP Embedded
 2 specifies that it is not to be used to configure XP
 3 Embedded to make a desktop operating system even though
 4 that would be technically possible.
 5 Q. And how would it be technically possible?
 6 A. One would just use the XP Embedded Target Designer tool
 7 by moving the mouse and clicking on which components you
 8 want to include, include all the components of Windows XP
 9 necessary to make a desktop operating system.
 10 Q. Can XP Embedded run the same applications as Windows
 11 XP?
 12 A. Oh, yeah, it's the same computer code. It supports the
 13 same APIs, so it can run all the same applications if all
 14 of those components are included in the configuration.
 15 Q. Could Windows XP Embedded be installed on a PC without,
 16 for example, Windows Media Player?
 17 A. Yes, one could make a configuration using this Target
 18 Designer that included all the pieces of the desktop
 19 operating system, except the media player, and perhaps the
 20 way the target designers are currently built, one would
 21 also have to leave out components that depended on the
 22 media player.
 23 Q. That's my next question: Do you have a question
 24 whether this existence of this product, Windows XP
 25 Embedded, could be used by Microsoft to create a version of

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1 the Windows operating system product that complies with
2 Section 1 of the States' proposed remedy?
3 A. Yes, I think with some minor engineering changes to the
4 XP Embedded Target Designer, that would be a good
5 configuration tool that Microsoft would be able to provide
6 to OEMs for the purpose of readily, so to speak, that OEMs
7 could use to readily remove the Microsoft middleware
8 products that they want to remove.
9 Q. And what minor engineering changes would those be?
10 A. Well, I can give some examples. Microsoft, the XP
11 Embedded Target Designer is provided with a list of sample
12 configurations. A configuration is just a list of which
13 components to include, and so they provide a sample
14 configuration saying, "Here are the components you might
15 include for a set-top box," and they provide another sample
16 configuration saying, "Here's all the components you might
17 include for a game console."
18 And the OEM is expected to start with this sample
19 configuration and say, "Well, for my set-top box, I'm going
20 to adjust the sample configuration by removing this
21 component and adding this component," and so on.
22 But Microsoft has not provided a sample
23 configuration that corresponds to a desktop operating
24 system with all the components necessary to support the
25 applications for the desktop operating system. It's

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1 possible to build such a configuration. The way one would
2 do it is start with some configuration that lacks lots of
3 components and start clicking. And I experimented with
4 doing this: I started clicking on components that I needed
5 to include to make a full-featured Windows XP, one-by-one,
6 and after an hour or so of clicking on components, I got
7 tired of it.
8 It would have been much easier if one of the sample
9 configurations that Microsoft included corresponded to the
10 set of components necessary for a desktop operating system.
11 So that's one of the ways in which the Target Designer
12 could be adjusted to be useful for the purposes of
13 complying with Provision 1.
14 Q. Are there other ways?
15 A. I think that one of the assumptions built into the
16 Target Designer is that if you're going to include one
17 component, then you also need to include any other
18 component on which it depends, which I think is very
19 reasonable for the purposes of constructing embedded
20 set-top boxes and so on. But the States' remedy Provision
21 1 requires that you be able to construct configurations
22 where you include this Microsoft middleware product and
23 don't include that Microsoft middleware product, even
24 though this one might call upon that one for some of its
25 functionality.

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1 So that assumption built into the Target Designer
2 would have to be changed so that the Target Designer would
3 permit such configurations.
4 And another example is the Target Designer does
5 have a way to take a group of subcomponents and say, well,
6 this is a major component and maybe I'm going to include
7 this entire major component. It has a way of drawing
8 boundaries around groups of components, and at the moment,
9 there is no way to draw boundaries around the components
10 that correspond to a particular Microsoft middleware
11 product, and so it would be good to have those boundaries
12 specified and have the Target Designer be able to process
13 them.
14 Now, these are minor engineering changes to this
15 configuration tool, and I don't think they would be
16 technically very difficult for the engineers who built this
17 configuration tool to make these modifications, so that
18 instead of being a way to select which components you want
19 for building set-top boxes and computer game consoles, it
20 would be a way to select which components you want out of
21 an unbound operating system.
22 Q. And just so we're clear, could you just tell us simply
23 what the Target Designer is?
24 A. Well, it's a user interface tool, so you run it and it
25 pops up on the screen, and in one subwindow it lists all

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1 the components that are available; in another subwindow, it
2 lists which components you've selected. You can ask it to
3 check dependencies between components and see if you left
4 anything out.
5 So it's a way for OEMs to evaluate whether the way
6 they've specified which components they want is a
7 reasonable one and is likely to work, and OEMs can, in
8 fact, even include their own components for interoperation
9 with the Microsoft ones.
10 Q. And the Target Designer is a tool that's currently
11 distributed by Microsoft with XP Embedded; is that correct?
12 A. That's my understanding, that that's part of the XP --
13 I guess what Microsoft provides as XP Embedded to OEMs is
14 the binary code for the operating system, which OEMs are
15 expected to redistribute, and the Target Designer, which
16 OEMs aren't really expected to redistribute; they're
17 expected to use it in selecting which components of the
18 operating system to redistribute.
19 Q. And the last question about XP Embedded is when the XP
20 Embedded runs on something such as a set-top box, is it
21 using the same binary files that Windows XP uses when it's
22 running on a PC?
23 A. Yes, it's using exactly the same operating system files
24 or that is, whichever ones of those files the OEM has
25 selected, so really Microsoft is suggesting to use the same

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1 operating system on the desktop, on the set-top box, on the
2 computer game console, and they even suggest that one of
3 the permissible uses of XP Embedded is to make a limited
4 functionality word processing tool or office productivity
5 tool that could even be used on a desktop.
6 Q. Now, apart from XP Embedded, you've also undertaken a
7 review of the Windows XP source code, and that was
8 discussed in your cross-examination. Do you recall that?
9 A. Yes.
10 Q. And have you been able to complete the review of the
11 Windows XP source code in the amount of time that it's been
12 available to you?
13 A. I've considered several different kinds of
14 investigations that I could make on the Windows XP source
15 code and binary code that was provided, and some of those
16 I've had a chance to complete and some of those I included
17 in my direct testimony.
18 And other investigations I'd like to make require a
19 fair amount of engineering efforts to construct,
20 measurement tools and so on, so I have some ongoing
21 investigations.
22 Q. And why is it that you haven't been able to complete
23 your investigation of the Windows XP source code in the
24 amount of time that you've been able to work with it?
25 A. Well, I've been able to work with it only for a few

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1 weeks, and there are many interesting questions relevant to
2 the two proposed judgements that one might ask in
3 connection with this case, and I -- just a few weeks is
4 certainly not been enough time for me to complete all of
5 those investigations.
6 Q. How many lines of source code is there?
7 A. When I exclude all the lines of source code that don't
8 actually do anything because they're just comments and
9 blank lines, I get approximately 39 million lines.
10 Q. That's a lot of lines?
11 A. That's a lot of stuff to read.
12 Q. But I want to clarify, the direct testimony that you
13 have submitted in this case, is that in any way dependent
14 on any examination or review of the source code that is
15 ongoing?
16 A. No, the direct testimony is based only on
17 investigations that I was able to complete.
18 Q. Professor Appel, do you recall being asked whether
19 Microsoft could comply with Section 1 of the States'
20 proposed remedy by hiding APIs in its Microsoft middleware
21 products?
22 A. Yes, I think I was asked about that.
23 Q. And I want to be clear: Is there a difference between
24 hiding APIs and removing end-user access to a particular
25 Microsoft middleware product?

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1 A. Yes, I think there is a difference. There are two ways
2 that one can access a middleware product: One is through
3 APIs where it's serving as a platform for application
4 development, and one is by the end-user who might click on
5 something on the screen. And if you remove only end-user
6 access, then you could still be leaving all the APIs there
7 that serve as a platform for application development, and
8 to the extent that the States' remedy is concerned with the
9 goal having to do with platforms for applications
10 development, there is a significant difference between
11 removing end-user access and removing or hiding APIs.
12 Q. Is it your testimony in this case that Microsoft could
13 comply with Section 1 of the States' proposed remedy merely
14 by hiding the APIs of its Microsoft middleware products?
15 A. No, I think that if there are some components of those
16 products that have functionality needed by other products,
17 then the code that implements that functionality might be
18 put in other products, but I don't think that it would be a
19 reasonable way to comply by keeping the entire Microsoft
20 middleware product, regardless of which parts are actually
21 needed, in specific other places.
22 Q. Have you had the opportunity to review the slides used
23 by Microsoft in the opening statement in this case that
24 contained an excerpt of your deposition testimony?
25 A. Yes, I think I saw those slides on the Microsoft.

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1 MR. HOLLEY: Your Honor, I think this is well
2 beyond the scope of the cross-examination. I didn't
3 mention anything about the opening or anybody's slides.
4 MR. HODGES: Your Honor, presumably the information
5 that was conveyed in opening statement was a reflection of
6 what Microsoft anticipated eliciting on cross-examination.
7 THE COURT: No, if the slides pertained to a topic
8 that they have covered, then I don't have a problem going
9 into it. If it's a totally different topic that has not
10 been talked about, then I don't think we need to go into
11 it.
12 MR. HODGES: I intend to show Dr. Appel one page of
13 the opening, and I think it pertains directly to a topic
14 that's been raised in cross-examination.
15 THE COURT: All right. Then I'll wait to see what
16 you say.
17 MR. HODGES: All right. May I approach the
18 witness, Your Honor?
19 THE COURT: Yes.
20 And this is exhibit what?
21 MR. HODGES: This is marked as Plaintiffs' Exhibit
22 1834, Your Honor.
23 THE COURT: Okay. And has this been admitted, not
24 admitted?
25 MR. HODGES: I'm merely showing to it Professor

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1 Appel; I'm not seeking to introduce it.
2 THE COURT: Okay.
3 BY MR. HODGES:
4 Q. Unfortunately, these aren't paginated, Professor Appel,
5 but I'm going to ask you to flip through at least
6 two-thirds of the way through to --
7 MR. HODGES: Perhaps I could approach the witness
8 and show him the page?
9 THE COURT: Go ahead.
10 BY MR. HODGES:
11 Q. Professor Appel, I've shown you one page from the
12 slides that Microsoft used in its opening statement, and
13 it's also up here on the screen for your convenience, and
14 it's entitled: "Must Microsoft Let OEMs Remove Microsoft
15 Middleware Product Code?" Subtitled "Compliance with
16 Section 1." Do you see that page?
17 A. Yes.
18 Q. Professor Appel, does this slide accurately
19 characterize your testimony as to whether Section 1 of the
20 States' proposed remedy would allow OEMs to remove
21 Microsoft's middleware product code?
22 MR. HOLLEY: Objection to the form of the question,
23 Your Honor. This is a direct quotation, so is the question
24 is the quotation accurate?
25 MR. HODGES: The question is whether --

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1 THE COURT: I think -- well, the question, I
2 guess -- well, this is supposedly taken out of a deposition
3 or whatever it was, okay. It would seem to me that you
4 would show him the whole thing, not what's up there, and
5 ask him if that's his opinion or not.
6 MR. HODGES: Your Honor, what I'm asking him is --
7 the question posed is must Microsoft let OEMs remove
8 Microsoft middleware product code to comply with Section 1?
9 THE COURT: Right, and there's a question and he
10 gives an answer, and so what are you asking him, if that's
11 his question and answer?
12 MR. HODGES: Let me rephrase the question.
13 THE COURT: Okay.
14 BY MR. HODGES:
15 Q. Is the answer to the question posed in the title of
16 this page, must Microsoft let OEMs remove Microsoft
17 middleware product code, is your answer to that question
18 no?
19 A. No, that's not my answer.
20 Q. What is your answer to that question?
21 A. Microsoft must let OEMs remove Microsoft middleware
22 product code. I have testified that in some cases where
23 there are components or fragments of those Microsoft
24 middleware products, then those particular components or
25 fragments could be moved to the other Microsoft middleware

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1 products that need that functionality, so long as they
2 don't expose APIs, but even in that case, the bulk of the
3 Microsoft middleware product code would be removed.
4 When I referred to in the quoted question, "that
5 component," I'm not referring to a Microsoft middleware
6 product. The context of that question in the deposition
7 was a reference to the MSHTML component of the Internet
8 browser, the Microsoft Internet Explorer, the Microsoft
9 middleware product.
10 So when I said in the particular case in the
11 context where it was asked that that component, the HTML
12 renderer could be left somewhere else in the operating
13 system, as long as it didn't expose APIs, I said that's
14 right, and then I believe I went on to explain, but I'm not
15 sure.
16 Q. Do you see where it says: "Tom Greene answered that
17 question yes," according to this Exhibit 1834?
18 A. Yes, I see that.
19 Q. Have you reviewed Mr. Greene's deposition in this case?
20 A. Yes, I have.
21 Q. Do you disagree with Mr. Greene on this point?
22 A. No, I think I agree with Mr. Greene on this point.
23 Mr. Greene says you may need to leave sufficient code
24 behind in order to make a particular OS functionality
25 operate. I don't think that means you may need to leave an

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1 entire Microsoft middleware product behind if the OEM
2 specifies that it must be removed.
3 Q. So to the extent that Plaintiffs' Exhibit 1834 suggests
4 that Tom Greene answered this question yes and you answered
5 this question no, you will disagree with that?
6 A. I would disagree. I think we both answered it yes.
7 Q. And if you look at the bottom line of this page from
8 the Microsoft opening, it says: "States' amended proposed
9 remedy," Section 4.A., Roman numeral i, "Can't Hide APIs."
10 Do you believe there is any disagreement between your
11 testimony and what is stated in Section 4.A., Roman numeral
12 i, of the States' proposed remedy?
13 A. I think that my testimony is entirely consistent with
14 the States' proposed remedy. The States' remedy does let
15 Microsoft hide all internal APIs. It says here in what's
16 been quoted on the screen: "Microsoft shall disclose all
17 APIs to enable each Microsoft middleware product to
18 interoperate, whether or not to internal APIs, with
19 external APIs of the platform software of the Microsoft
20 middleware product."
21 So if you take a fragment or component or
22 sufficient code and put it in some other place where it
23 doesn't expose APIs, then that API of that fragment or
24 component will not be an API that is used to enable
25 interoperation between components; and therefore, it's

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1 perfectly permissible to hide it even under Section 4 of
 2 the States' proposed remedy.
 3 Q. To be clear, what is an internal API?
 4 A. It's an API that is between different subcomponents of
 5 a component and not meant for use by things external to
 6 that group of subcomponents.
 7 Q. Would the States' proposed remedy require the
 8 disclosure of internal APIs?
 9 A. No, only of APIs used to interoperate, and so the vast
 10 majority of the APIs in the implementation of the Microsoft
 11 operating system product would not have to be disclosed
 12 under either remedy.
 13 Q. Is there any way to measure how many internal APIs
 14 there are in a Windows operating system product?
 15 A. Yes, one thing I've done is I've measured how much of
 16 the lines of source code, of those 39 million lines of
 17 source code, appear to be the kind of source code that just
 18 describes APIs, and I found that approximately a quarter of
 19 the source code of the Microsoft operating system, that is
 20 approximately 10 million lines of code, describes APIs,
 21 external and internal, and approximately 440,000 lines of
 22 APIs describes external APIs that Microsoft has already
 23 disclosed.
 24 And so I believe in my direct testimony, I said
 25 that the externally disclosed APIs, the ones that Microsoft

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1 discloses, amount to about 1.2 percent of the entire
 2 operating system. They amount to, if I do the calculation
 3 right, about four and a half or five percent of all of the
 4 APIs.
 5 So, the vast majority of APIs would not need to be
 6 disclosed by either remedy, and, in fact, the vast
 7 majority, I think, and certainly the majority of the APIs
 8 that either remedy would require to be disclosed, are
 9 already disclosed by Microsoft so that application
 10 developers can make their applications interoperate with
 11 the Microsoft platform software.
 12 Q. If that's the case, then why is the disclosure remedy
 13 under the States' proposed remedy necessary?
 14 A. Because by selectively withholding certain disclosures,
 15 Microsoft can make it much more difficult for independent
 16 software developers to achieve full interoperation, and
 17 just by withholding a few APIs, Microsoft could, I think,
 18 cripple the functionality of applications that -- or
 19 middleware that depend on that functionality.
 20 Q. Professor Appel, you were asked in your
 21 cross-examination whether it would be possible for third
 22 parties to create, replicate or create functional
 23 substitutes of Microsoft platform software. Do you
 24 remember that testimony?
 25 A. Yes.

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1 Q. Do you have an opinion as to whether, based on the
 2 disclosures that would be provided under Section 4 of the
 3 States' proposed remedy, whether it would be possible for a
 4 third party to make a copy of the Windows operating system?
 5 A. I think those disclosures are not technically
 6 sufficient to make a copy, unless somebody could, I guess,
 7 walk into the facility and remember 39 million lines of
 8 code. But the disclosure would be helpful in making things
 9 that are not copies but functional substitutes for the
 10 Microsoft platform software.
 11 Q. And what would the purpose be of a functional
 12 substitute?
 13 A. Well, I guess one would want to sell platform software
 14 to a user who might have otherwise bought the Microsoft
 15 platform software, so that it could run the set of
 16 applications that the end-user wants to run.
 17 There are some users, for example, who want to run
 18 a different operating system because of the applications
 19 available for that operating system, let's say Linux.
 20 There are some applications and server software that runs
 21 very well on Linux, but those users also want to be able to
 22 run some of the applications for Microsoft platform
 23 software. For example, they want to run Microsoft Office
 24 or they want to run non-Microsoft application software, one
 25 of those 70,000 applications that can run on the Microsoft

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1 platform.
 2 And now they have the choice, they can buy two
 3 computers or they can dual boot their computer or they have
 4 a variety of technical choices which aren't very
 5 attractive, and if one could support some subset of the
 6 Windows APIs, or some subset of the APIs exported by a
 7 Microsoft middleware, then some of those applications that
 8 run on the Microsoft middleware would also run on the other
 9 platform, and so a user interested in those applications
 10 would be able to purchase them and run them on the
 11 functional substitute or the Windows operating system.
 12 Q. Would the disclosures that would be required by Section
 13 4 of the States' proposed remedy, would that enable a third
 14 party to develop a full, functional substitute for the
 15 entire Windows operating system?
 16 A. In principle, that would be possible, but they would
 17 still have to do the engineering work to actually build it.
 18 That is, the disclosures of what functionality is requested
 19 at each API then leaves one with the task of building and
 20 implementing all of that functionality.
 21 Q. What do you mean to build and implement all that --
 22 A. Well, one has to write all of the source code that does
 23 all the operations that's being requested at the API
 24 boundary, so, as I explained, there were 39 million lines
 25 of source code in the Microsoft operating system, and 10

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1 million lines of them specified to API boundaries, so I
2 believe approximately 30 or 29 million lines of code
3 implements the actual operation of all the components of
4 the Windows operating system.
5 Q. And would the States' remedy require those 29 or 30
6 million lines of code to be disclosed?
7 A. The States' remedy certainly doesn't require those 29
8 million lines to be disclosed, and it also doesn't require
9 almost all of the other -- the 10 million lines of internal
10 API's to be disclosed. So because the source code of the
11 Microsoft operating system and the technical details of how
12 it achieves its functionality are not required to be
13 disclosed under the Microsoft remedy, anybody who would
14 wish to make a functional substitute for it would have to
15 invent and write it on their own, and that means the
16 engineering of a lot of source code.
17 Q. So the 10 million lines of code you refer to are both
18 the internal and the external APIs; is that right?
19 A. There are approximately 10 million lines of APIs, and
20 approximately 9 and a half million lines of them are
21 internal APIs that wouldn't have to be disclosed, and of
22 course, there are the approximately 29 million lines of
23 code that are not APIs and would not have to be disclosed.
24 Q. So does that get us to about 39 million lines of code
25 that would not need to be disclosed? Am I counting

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1 correctly?
2 A. Yeah, that's about right.
3 Q. Professor Appel, you were asked earlier whether the
4 RealPlayer distributed by ReaLNetworks would suffer
5 problems if Internet Explorer was not present on the
6 desktop, I think Mr. Holley's words were, "Would it be in a
7 world of hurt."
8 Do you have an opinion on whether, in fact that
9 would be correct or not?
10 A. I believe that RealPlayer or the RealNetworks' media
11 player can actually interoperate with other browsers, and I
12 think I've seen testimony to that effect by the witness,
13 Mr. Green from ReaLNetworks.
14 Q. I believe that's Mr. Richards from ReaLNetworks.
15 Do you recall what testimony that was that you were
16 looking for -- that you were looking at?
17 A. I think it was his written direct where he says that
18 when they run the RealMedia player on the Microsoft
19 operating system, they use Internet Explorer to achieve
20 browser functionality, and when they use that same
21 middleware on a non-Microsoft operating system, they use
22 other Internet browsers to achieve that same functionality.
23 MR. HOLLEY: And can we get to Mr. Richard's direct
24 testimony? Can you take a look? I don't have the copies
25 to hand out, but this has been admitted as an exhibit

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1 previously. Can you tell me what page you're on?
2 This was Plaintiffs' Exhibit 1598.
3 BY MR. HODGES:
4 Q. If you could read that, Professor, and tell me if
5 that's the testimony to which you were referring.
6 A. Yes, that's the testimony that I'm referring to.
7 Q. So based on that, you have an understanding that
8 RealPlayer, in fact, will interoperate with browsers other
9 than Internet Explorer?
10 A. Yes, when RealPlayer gets services from the browser
11 platform software, it's able to get it from a non-Microsoft
12 browser.
13 Now, it says here they only do this on a
14 non-Microsoft operating system, but it's clear to me that
15 there's no reason they couldn't also do that on a Microsoft
16 operating system. They've just chosen not to because
17 they've done all the work necessary to get the services
18 from the other browser, and it doesn't seem to have been a
19 problem for them.
20 Q. So you would disagree with Mr. Holley when he stated
21 that the RealPlayer would not work if Internet Explorer is
22 not present; is that correct?
23 A. That's right, RealPlayer, according to this testimony,
24 already runs in configurations where Internet Explorer
25 isn't present, and it gets the full functionality that it

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1 needs from another browser.
2 Q. Professor Appel, you were questioned about whether the
3 cross-dependencies of the Microsoft middleware products in
4 Windows XP could be investigated and determined, and do you
5 recall that testimony?
6 A. Yes.
7 Q. Is there a way in which these -- this investigation and
8 determination could be accomplished?
9 A. Yes. I think that this would be a very feasible
10 engineering task. I think that much of the information may
11 already be in the Windows XP Embedded tool kit, which does
12 tell about a lot of the dependencies between all the
13 software components of the Windows operating system
14 including the Microsoft middleware components.
15 I can't be sure that all of the dependencies
16 information is there and is correct, so I can think of
17 other technical means that I would use to analyze the
18 dependencies between the Microsoft middleware products, and
19 I don't think it's a trivial task, but I don't think it's
20 at all an infeasible task to do in the matter of a few
21 weeks.
22 Q. Professor Appel, you were questioned on
23 cross-examination about Professor Felten's investigation in
24 the liability phase of this trial. Do you recall that?
25 A. Yes.

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1 Q. What was the purpose of Professor Felten's
2 investigation that he undertook in the liability phase of
3 the trial?
4 MR. HOLLEY: I object to the form of the question.
5 I don't think this witness is in any position to talk about
6 what somebody else's purpose was, especially in light of
7 the testimony at his deposition that he's forbidden to talk
8 to Professor Felten about that subject.
9 THE COURT: I think you're going to have to reframe
10 it.
11 MR. HODGES: I'll rephrase the question. I'll
12 rephrase the question.
13 BY MR. HODGES:
14 Q. Professor Appel, what's the basis for your
15 understanding of Professor Felten's investigation in the
16 first phase of this trial?
17 A. It's from reading his testimony of what he did and the
18 context of the case in which he did it.
19 Q. And based on that understanding, do you know what the
20 purpose of his investigation was?
21 A. Yes, I think I can determine the purpose.
22 Q. And what do you understand that purpose to be?
23 A. I think one of the issues at trial was the binding of
24 Internet Explorer to Windows 98, and there were several
25 different mechanisms used in that binding. One was a

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1 license restriction by Microsoft specifying what OEMs could
2 and could not ship. Professor Felten didn't investigate
3 that as part of a technical investigation; that was a
4 non-technical means.
5 Another means was that Microsoft artificially
6 removed the end-user's ability to delete the browser from
7 the system: That is, for most software that you have on a
8 Windows operating system, after you install the software,
9 if you decide you don't want it there anymore, there is a
10 control panel to remove it, and Microsoft had disabled that
11 for Internet Explorer in Windows 98.
12 Another way of binding the browser to the operating
13 system involved the different ways that the browser could
14 be invoked: That is, in the Microsoft Windows 98 operating
15 system, there were many different ways that you could start
16 browsing. You could click on an icon on the desktop and it
17 would open up the browser to view something related to that
18 icon. You could type the name of a Web page into some
19 control on the desktop or in the help system or -- there
20 were just approximately 20 different ways that you could
21 get to browsing when you hadn't been browsing already, and
22 these are ways of invoking the browser.
23 And there was the concept that the user could
24 choose which browser he wanted to use as his default
25 browser, and he could register that choice with the

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1 operating system and say, "When I start -- when I do one of
2 these things to start browsing, I want to use Internet
3 Explorer or I, in general, want to use Netscape Navigator,"
4 and so when the user would click on one of the many ways
5 that would invoke browsing, the Microsoft operating system
6 could look up the user's choice of which browser he wanted
7 to use and start that browser. But the binding aspect was
8 that for many of the ways that Microsoft provided to start
9 browsing, it would not respect the user's choice of default
10 browser. Regardless of what the user had specified as the
11 browser he wanted to use, the Internet Explorer browser
12 would be used.
13 And so what Felton was investigating was different
14 aspects of the technical means that Microsoft had used to
15 bind the browser to the operating system and were those
16 bindings technically necessary? That is, was there any
17 deep technical reason why these bindings were necessary?
18 So what he did was he made a program that would unbind in
19 these different technical ways the browser from the
20 operating system. He made it removable by the end-user
21 control and he made the operating system respect the user's
22 choice of default browser in all the ways of invoking the
23 browser that he could find.
24 And I think his focus was less on seeing how many
25 modules of software code he could delete from the operating

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1 system. He was concentrating on the technical means of
2 binding.
3 Q. Was he attempting to substitute an alternate to the
4 Internet Explorer browser?
5 A. Well, he showed that you could install an alternate
6 browser. I think he used Netscape Navigator. And he
7 showed that not only could you use the end-user removal
8 mechanism to delete the Netscape Navigator icon from the
9 screen, but that the Netscape Navigator browser could be
10 substituted in such a way that for all these means of
11 invoking the browser, the Netscape Navigator browser would
12 be used instead of the Internet Explorer browser.
13 Q. And was there a question whether even that could be
14 done with Windows 98 and Internet Explorer?
15 A. Well, Microsoft had represented that the operating
16 system and the browser were so unitary a product that there
17 was no reasonable technical means of separating and
18 unbinding in ways such as I've described, and so he did a
19 technical experiment to see whether that was true.
20 Q. And was it true?
21 MR. HOLLEY: Your Honor, I object to the question.
22 Dr. Appel doesn't know what Microsoft asserted, and I don't
23 think he has a basis to opine about whether that was true
24 or not.
25 THE COURT: Are you objecting to his last answer?

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1 MR. HOLLEY: Yes, I move to strike it.
2 THE COURT: All right, I'll consider it.
3 MR. HODGES: I'm sorry, Your Honor.
4 THE COURT: It seems to me that I'm not sure
5 what -- I don't know whether he knows what Microsoft --
6 what Microsoft represented, so I would have to have,
7 frankly, some different foundation. So my inclination is
8 not to go by what he has said that they've represented.
9 Presumably the record is there and I can take a look at it
10 as opposed to relying on what he thinks is represented in
11 it.
12 MR. HODGES: And my intent is simply to ask him his
13 understanding of what the purpose of Dr. Felton's
14 investigation was and what it accomplished.
15 THE COURT: All right. Well, that we have on the
16 record at this point.
17 MR. HOLLEY: Well, Your Honor, I would just point
18 out that the this subject was addressed by the Court of
19 Appeals and its conclusions were exactly the opposite of
20 the direction of Mr. Hodge's questions, so I object to this
21 entire line of questioning that its' inconsistent with the
22 Court of Appeals' opinion.
23 MR. HODGES: Can I move to strike Mr. Holley's
24 testimony, Your Honor?
25 THE COURT: I don't know that I consider it

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1 testimony. I will take a look at it and go back, and I'm
2 not going to get into an argument with it now, and it is
3 also after five, so where are you in terms of your --
4 MR. HODGES: May I ask simply two more minutes'
5 worth of questions, Your Honor, and then I'll be finished
6 with Professor Appel.
7 THE COURT: I will time you for the two minutes.
8 Go ahead. If it's two minutes, I'll let you.
9 BY MR. HODGES:
10 Q. Professor Appel, you were questioned about whether the
11 Windows desktop had to be removable under the States'
12 proposed remedy, and I must admit that I didn't quite
13 understand your answer to that question, so can you please
14 tell me, what is your opinion on that issue?
15 A. The question was whether it might be in some
16 circumstance considered as middleware and therefore whether
17 the Provision 1 might somehow apply to it, but I believe
18 that the Windows desktop -- Microsoft does not need to make
19 the Windows desktop removable under the States' remedy and
20 that's because of Provision 2. In Provision 2, C3 near the
21 bottom of page 4, "Microsoft shall not restrict the OEM
22 from displaying any non-Microsoft desktop, provided that an
23 icon or other means of access that allows the user to
24 access the Windows desktop is also displayed."
25 And that means that the Windows desktop, the

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1 software that supports the view of icons and Windows and so
2 on and a task bar at the bottom must be present, if
3 Microsoft requires it, on all copies of the Windows
4 operating system shipped by OEMs. So it is clearly not an
5 optionally removable component, and therefore, all of the
6 core Windows APIs upon which the Windows desktop relies are
7 clearly also not optionally removable.
8 Q. Final question, Professor Appel: You were asked if
9 software that exposes only one API could be middleware. Do
10 you recall that?
11 A. Yes.
12 Q. Can you explain how it is that software that exposes
13 only one API can be considered middleware?
14 A. An API properly speaking is a collection of functions.
15 It may be a small collection of ten functions or one
16 function, or it could be a collection of a thousand
17 functions, and when an application is built to get some of
18 its services from a middleware and other of its services
19 from an underlying operating system, then to the extent
20 that it gets more of its services from a middleware, then
21 it will be that much easier to port to other operating
22 systems. It's not an all-or-nothing thing.
23 And also, several middleware products can
24 collectively provide enough APIs so that an application by
25 relying on a combination of these middlewares will be

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1 easily portable to another operating system if all of those
2 middlewares are ported. So it shouldn't be the idea that
3 to be middleware it has to provide a complete platform all
4 by itself for the application.
5 MR. HODGES: Thank you, Professor Appel. I have no
6 more questions. Thank you, Your Honor. That was probably
7 slightly longer than two minutes.
8 THE COURT: That's fine. I'll excuse you at this
9 time.
10 If I could just clarify, Mr. Holley, when you were
11 talking about the Court of Appeals, precisely what subject,
12 since he talked about two sets of subjects in his
13 questioning? One was the issue around the end-user and the
14 other was the issue -- is that what you were referring to?
15 MR. HOLLEY: I was referring in particular to the
16 notion that the Court of Appeals said that it was perfectly
17 all right for Microsoft to override the user's
18 specification of Netscape Navigator as the default Web
19 browsing software in the situation of Windows update,
20 Windows help, and also the in-place navigation in Windows
21 Explorer between Web sites on the one hand and local
22 resources on the other. And do we have a copy of the
23 opinion?
24 THE COURT: I have it here. That's what I was
25 looking at.

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1 But you're talking about in the context of the
 2 either the browser -- the section on browsers or the
 3 license restrictions?
 4 MR. HOLLEY: I think in this particular instance,
 5 the Court of Appeals is talking about the design of the
 6 operating system such that it overrides the user's default
 7 choice.
 8 THE COURT: Right. They had it set up and I --
 9 MR. HOLLEY: Your Honor, if you look at 253 F. 3rd
 10 on page 67, the Court of Appeals is talking about, "As for
 11 the other challenged act that Microsoft took an integrating
 12 IE into Windows causing Windows to override the user's
 13 choice of a default browser in certain circumstances,
 14 Microsoft argues that it has valid technical reasons," and
 15 then it goes on to quote Microsoft's brief on this subject.
 16 And then the Court of Appeals concludes that the
 17 plaintiffs bear the burden not only of rebutting the
 18 proffered justification, but also of demonstrating that the
 19 anticompetitive effect of the challenged action outweighs
 20 it. In the District Court, plaintiffs appear to have done
 21 neither, let alone both. In any event, upon appeal,
 22 plaintiffs offered no rebuttal whatsoever. Accordingly,
 23 Microsoft may not be held liable for this aspect of its
 24 product design."
 25 And the section of Microsoft's appellate brief that

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1 is quoted refers to Windows help, Windows update, and the
 2 ability in something called Windows Explorer or My Computer
 3 to look both at Web pages and the C drive of your computer
 4 in the same window without launching a separate Web
 5 browser. So that's what I was referring to, Your Honor.
 6 THE COURT: Anything that you want to add?
 7 MR. HODGES: Yeah, Your Honor, if I may. The
 8 purpose of the questioning was not -- certainly not to
 9 contradict the Court of Appeals, nor is it to try to allege
 10 or prove something other than what was found in the
 11 liability phase of the trial.
 12 There was a suggestion in cross-examination that
 13 what Professor Felten had undertaken to do was to somehow
 14 perform a test that would support or not support Section 1
 15 of the States' remedy about unbinding and commingling. I
 16 was simply trying to make the point that the purpose of
 17 Professor Felten's examination was for something different,
 18 because at that time, Internet Explorer could not be
 19 removed from Windows in the usual manner, which is a
 20 finding in the case, and he was testing to see whether a
 21 substitution could be made.
 22 So he was not trying to remove the code; he was not
 23 trying to support Section 1 of the States' proposed remedy
 24 which, in fact, didn't even exist at the time. So I -- so
 25 I just want to make clear that the purpose of this

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1 testimony -- of Dr. Felton's examination is not the same as
 2 what I believe at least was represented in
 3 cross-examination.
 4 THE COURT: All right. I'll have to say it got
 5 murky in the presentation of it, and you began to lose me
 6 near the end. Okay. It's as I recollect. I just wanted
 7 to make sure since they discussed two different -- his
 8 testimony related to two topics, as to what exactly you
 9 were referring to.
 10 MR. HOLLEY: Your Honor, I don't want to belabor
 11 this, especially given the hour, but I want to note for the
 12 record that I vehemently disagree with what it was that
 13 Mr. Hodges says Professor Felton was attempting to do. I
 14 don't think now is the occasion to debate it, but I didn't
 15 want to let the past that -- to suggest that I agreed with
 16 that characterization.
 17 THE COURT: I assumed that you didn't.
 18 MR. HODGES: And I agree it's not the time to argue
 19 it.
 20 THE COURT: All right. So tomorrow, then, we start
 21 with Mr. Shapiro. All right. Let me, if you will come
 22 back for a quick second, I will indicate where you are on
 23 your time. So let me excuse you, and I'll see you tomorrow
 24 at 9.
 25 (Proceedings adjourned at 5:15 p.m. until Thursday,

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1 April 11, 2002.)
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 3
 4 C E R T I F I C A T E
 5
 6 I, Scott L. Wallace, Official Court
 7 Reporter for the U.S. District Court for the District
 8 of Columbia, do hereby certify that as such reporter I
 9 took down in stenotype all of the proceedings had in
 10 said U.S. District Court in the above-entitled cause;
 11 that I have transcribed my said stenotype notes into
 12 typewritten form, as appears in the foregoing
 13 Transcript of Proceedings; that said transcript is a
 14 complete record of the proceedings had in the trial of
 15 said cause and constitutes a true and correct
 16 Transcript of Proceedings had therein.
 17
 18
 19
 20
 21 -----
 22 Scott L. Wallace, RDR, CRR
 23 Official Court Reporter
 24
 25

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